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No. 18

DEPARTMENT OF AGRICULTURE.

SPECIAL REPORT—No. 4.

CULTIVATION

OF

THE FIG,

AND THE

METHOD OF PREPARING THE FRUIT FOR COMMERCE;

ALSO,

REPORT

ON THE

IMPORTANCE OF THE CULTIVATION

OF THE

DATE PALM.



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THE FIG.

The climate of the Southern and Middle States, and a portion of the Pacific coast, is well adapted to the growth of the Fig. The fruit of this tree is so great a luxury, and so useful in many ways, that there is no reason that it should not become a very considerable article of commerce to the people of these States, and thus add to the wealth of the whole country.

A writer in the "Treasury of Botany" gives a very interesting description of the *Ficus carica*, or the Fig of the garden. The name *Ficus*, applied to this very anciently known fruit, is most probably derived from *Feg*, its Hebrew name; that of *carica* is from *Caria*, in Asia Minor, where fine varieties of it have long existed. According to various authors, it is a native of Western Asia, Northern Africa, and the South of Europe, including Greece and Italy. It is certainly indigineous to Asia Minor; but it may have been thence introduced and naturalized in the islands of the Mediterranean and the countries near its shores, both in Europe and Africa.

The fig is a deciduous tree (one whose leaves fall in autumn), and grows 15 to 20 or even 30 feet high, in favorable climates. The alternate leaves are cordate or heart-shaped, more or less deeply, three to five lobed, and rough.

The fruit is generally shortly turbinate, or shaped like a top or cone inverted, but some varieties are of an elongated pear shape; the skin soft, with shallow longitudinal furrows; the color yellowish-white, greenish-brown, purplish-brown, violet, or dark purple. It consists of a hollow, fleshy receptacle, with an orifice in the top, which is surrounded and nearly closed by a number of imbricated scales, or scales lying over each other like tiles, as many as two hundred, according to Duhamel. The flowers, unlike those of most fruit-trees, make no outward appearance, but are concealed within the fig on its internal surface. They are male and female; the former situated near the orifice, the latter in that part of the concavity next the stalk. On cutting open a fig when it has attained little more than one-third its size, the flowers will be seen in full development, and, provided the stamens are perfect, fertilization takes place at that stage of growth; but it often happens that the stamens are imperfect, and no seeds are formed; nevertheless, the fruit swells and ripens. Under favorable circumstances, a fig or two is formed along the shoots at the base of almost every leaf. Of these, the quantity that sometimes attains maturity is enormous; but frequently, from vicissitudes of cold in some climates and heat in others, much of the fruit drops prematurely. It may not do so at the time when dryness prevails, but at some future period, when moisture is sufficiently abundant; in fact, the injury caused by drought to this fruit becomes most apparent after moisture has started the tree into vigorous growth; and hence the true, but remote, cause of failure in the crop is apt to be overlooked. And if this

be sometimes the case now, it was much more likely to be generally so in former times, when there was among cultivators but little intelligence as regards tracing effects to their causes.

Accordingly, to prevent the fruit of the fig-tree from dropping prematurely, and to hasten its ripening, the process of caprification was resorted to. This consisted in placing the fruit of a wild sort, called the Caprifig, amongst the cultivated ones. An insect of the gnat family infests the former, which it leaves to attack the latter, entering to the interior of the fruit by the orifice. This is a very ancient practice, for it is mentioned by the earliest Greek writers on natural history. It appears to have originated in Greece. Pliny, whose works on such subjects are still standard authority, remarks that it was only used in the islands of the Archipelago; that in his time it was entirely unknown to the Italians, and that there was no tradition of its ever having been introduced to Syria or Palestine. Its utility was doubted by some authors, and, among others, by the celebrated Duhamel. He thought it questionable whether, by caprification, the maturity of the fruit was hastened, except in the same way as apples and pears are when attacked by the grub.

Professor Gasparrini, in an essay written for the Royal Academy of Sciences of Naples, details a number of experiments which he had made and repeated in different years. Their results led to the conclusion that caprification is useless for the setting and ripening of the fruit, and instead of making the figs remain on the tree, it causes their fall, especially when the insect has penetrated into the inside and produced decay by its own death. According to Gasparrini, the practice of caprification ought to be abolished, as it entails expense and deteriorates the flavor of the figs. The French naturalist, Oliver, says it is being abandoned in some islands of the Archipelago, where it was formerly practiced, but in which excellent figs are still produced.

We have thought it necessary to briefly notice the operation, as so much has been written with regard to its presumed advantageous effects; but, from what has been stated, it will be seen that, according to the investigation of modern science, it is proved to be not only unnecessary, but positively injurious.

Figs have been used in the East as an article of food from time immemorial. They were among the fruits brought back from Canaan by the Israelites sent by Moses to report on the productions of that land. We read of a present having been made to David of two hundred cakes of figs. They were probably used chiefly in the dried state. The drying is easily effected in a warm climate by exposure to the sun's rays, in the same way as grapes are dried, which are called, from that circumstance, raisins of the sun. Like the grape, the substance of the fig abounds in what is termed grape-sugar. In drying, some of this exudes and forms that soft, white powder which we see on the imported dried figs. They are thus preserved in their own sugar and rendered fit for storing up as an article of food.

Figs were considered of such necessity by the Athenians that their exportation from Attica was prohibited. Those who informed against persons violating this law were called "sycophantae," from two Greek words, signifying the discoverers of figs. These informers appear to have been especially disliked,

for their name gave rise to the term "sycophant," used by designing liars and imposters generally, as well as flatterers.

Only six varieties of figs were known in Italy at this time. Others were introduced from Negropont and Scio, according to Pliny, who gives a catalogue of thirty sorts.

The fig may have been introduced into Britain, along with the vine, by the Romans, or subsequently by the monks; but if it had, it seems to have disappeared till brought from Italy by Cardinal Pole, either when he returned from that country in 1525, or after his second residence abroad, in 1548. In either case, the identical trees which he brought, and which were planted in the garden of the Archiepiscopal palace at Lambeth, have certainly existed for more than three hundred years. This proves that the fig lives to a great age, even under less favorable circumstances than it enjoys in its native country. Another tree, from Aleppo, was planted in the garden of one of the colleges at Oxford, England, in 1648. Having been injured by fire in 1809, the old trunk decayed, and was removed; but fresh shoots sprang up, some of which, in 1819, were 21 feet high. In England, in a country of chalk subsoil and a climate like that near the south coast, the fig is well suited. There the trees grow and bear as standards. They are liable, however, to be killed to the ground in winters of excessive severity, but they spring up afresh from the roots.

The dried figs are obtained in large quantities from Turkey, the Mediterranean, and other countries, but the supply for centuries back has been chiefly from Turkey.

The wood of the fig is soft and spongy, and as it can in consequence be easily charged with oil and emery, it is used in some countries by locksmiths and armorers for polishing.

The fig was introduced into this country by the Spaniards at the time they settled Florida. It is now grown in abundance in nearly all the Southern States, and can be grown successfully by protecting the trees in winter, in the Middle and some of the Northern States.

The fig is a very thrifty tree and requires little attention in its cultivation. It thrives best in rich, mellow soil, well drained, but kept moist, by sufficient rain-fall; but it will grow well upon the poorer and drier soils. Sunny locations are the best selections to perfect the fruit. It is propagated from cuttings of the same year's growth, or from sprouts from stool-plants. They make a fine growth during the first season, and begin to bear the year following. In warm climates two crops of fruit are produced from the fig-tree, each crop being produced on distinct sets of shoots. The second crop grows from the eyes or buds of the shoots made in early summer, and if the season be sufficiently long and warm, the fruit will ripen. In such climate it is the second crop that is most prolific and valuable, and that is used in drying for exportation. In climates where the winters are severe, the trees are so trained that the branches can be tied in bundles and laid along the ground, when they are covered with litter and earth. In setting out the plants, it is necessary to give them room according to their size, and they will require little other attention except clean culture. There are few fruit trees, with so little trouble in their

cultivation, that bear so abundantly, or yield so much for so little care, as the fig-tree. The mode of sticking cuttings is to prepare the ground well, make a narrow trench from an inch to an inch and a half deep, and then drive into the ground the cutting to the depth of six or seven inches. The upper part of the cutting is then bent down in the trench and covered with earth to the level of the ground. The top of the cutting, however, must be bent upwards again and made to stand out of the ground. Around the top of the cutting make a small excavation and fill with straw, in order to keep the soil in a good condition of moisture. When planted in this way the cutting will take root promptly and vegetate thriftily, bearing fruit the second year, and sometimes, in favorable situations, the first year. There are many varieties of the fig, and they may be increased either by seed or the method of cuttings. They may also be grafted with a new variety about the time when the sap begins to move.

Very little pruning is required, as the branches and leaves are necessary for protection against heat and cold. The variety known as the "White Fig," imported from France, is sufficiently hardy, with slight protection, to withstand the climate of the Middle States. It is kept low and shrub-like, so that it may be bent to the ground and covered with earth in winter to protect it from frosts.

The best varieties for cultivation, on account of the excellence of the fruit and their adaptability to drying, are those known as the Brunswick, Large White, Ischian, Genoa, Smyrna, and Figue d'Or. The brown fig of Turkey is also a favorite variety.

Turkey and Italy furnish to the world the largest amount of the dried figs of commerce. More than a thousand tons are annually imported into Great Britain. The annual importations into the United States amount to nearly a half million of dollars.

In the countries of the East the dried fig forms an important article of food.

In Morocco, and the regions of Northern Africa bordering upon the Mediterranean, the fruit of the fig-tree and the nut of the almond-tree are compounded into a food, condensed, self-preservative, nutritious, and as simple and healthful as it is cheap and delicious. In the northern regions of Asia and Africa they are used for dessert and for medicinal purposes, being applied to gum-boils and other sores, and also administered in pulmonary and nephritic affections, and to relieve habitual constipation.

All the correspondents of the Department of Agriculture familiar with the cultivation, &c., of the fig-tree in the different Southern States, unite in the statement, drawn from their experience and observation in those States, that the fig-tree is remarkably healthy, free from diseases and the ravages of insects, and that each tree will produce from two to ten bushels of fruit at a crop.

Mr. ARTHUR P. FORD, of Charleston, S. C., writes :

A fig-tree in full bearing will produce from six to ten bushels of fruit at a crop, and two crops annually.

Mr. JOHN A. CRAIG, of Tallahassee, Fla., writes :

The yield of the fig-tree is most prolific. A few trees will give a large family all they will consume, besides furnishing the poultry and pigs with a considerable portion of their food during the fruiting season.

Col. GEORGE B. CLITHERALL, of Mon Louis Island, Ala., writes :

The fig-tree will yield fruit the second and third year from the cutting, and will bear for forty years or more, yielding from five to ten bushels of figs each season. It is not subject to disease or the ravages of insects ; indeed, we have not a healthier tree in the South.

Mr. A. J. BERCH, of Palatka, Fla., writes :

The fig-tree at six years old, with a sufficient amount of room and suitable soil, will produce on an average from five to six bushels to the tree, and increases to three times that quantity in a few years. There are trees in this country that produce from twenty to thirty bushels of figs a year. I do not know the ages of these trees.

Mr. C. H. REED, of Birmingham, Ala., writes :

The fig is one of the most prolific of all fruit-trees. It commences to bear at two years, and has two crops each season. The average crop is from six to ten bushels from each tree each season. I do not know of any insects or diseases that this tree is subject to in this locality. We dry them here by a simple process. The fruit is gathered when fully ripe, before it becomes soft. It is then placed on trays of wood and put in the sun. Two or three days are sufficient to dry them. Then put them in a hot oven for a few moments, to destroy the vitality of eggs which flies or insects may have laid on them while drying in the sun. They are then packed in layers, with fine white sugar sprinkled on each layer.

Mr. G. W. STONER, of Shreveport, La., says :

The fig-tree when once rooted requires very little attention. The second year it bears fruit, and the yield is increased each succeeding year. A few trees afford all the fruit a family needs, and hogs and poultry fatten on them readily. It is not troubled by disease or insects.

Mr. A. LARGENBUGER, Anaheim, Cal., writes :

I have dried the fruit of the blue fig by placing the same in the sun, turning it every day, and covering it at night to keep the dew off, and had excellent dried figs. I would say that fifty pounds of dried figs could be harvested from a large tree.

Mr. W. W. BRICE, Centerville, Alameda County, Cal., writes :

A fig-tree six or seven years old in this climate will yield one hundred pounds of figs. A full-grown tree is said to yield from two hundred to six hundred pounds.

Mrs. MORRISON ROBBINS, Carrollton, La., writes :

Fig-trees bear at three years old. The average yield of a tree from five to fifteen years old is about three bushels each season. We have not found any insect that injures fig-trees. They are hardy and healthy.

Mr. H. M. STRINGFELLOW, Galveston, Tex., writes :

The fig seems to enjoy almost perfect immunity from all insect depredations, their only enemy being birds, and they bear so abundantly that even the birds cannot do much damage. In fact this fruit succeeds so perfectly all over the State, and is grown so easily, that it has no market-value in its green or fresh state. I see no reason why it should not be dried as profitably in Texas as anywhere else.

Mr. N. B. HARDEN, Marietta, Ga., writes :

The fig bears two crops a year here. The first crop ripens in June, the second in September. I suppose an ordinary tree six or seven years old will produce five or six bushels of fruit annually. I have seen large old trees bear double, perhaps thribble, that quantity.

Mr. JOSEPH SEXTON, Santa Barbara, Cal., writes :

The fig grows remarkably well here and is very prolific. A tree ten years old will measure about one foot in diameter, and will yield about eight hundred pounds of fruit a year.

Mr. B. MATHERS, Fayetteville, Tex., writes :

All varieties of the fig grow well here. A tree well rooted will bear the first year. They are very healthy and prolific.

Dr. H. M. STUART, Beaufort, S. C., writes :

Fig-trees attain a large size and are long lived in this climate. There are celestial fig-trees in this place which have been bearing fruit for more than forty years, and they bear very large crops. The fig does well on almost any quality of good land.

Mr. W. M. SUMNER, Pomaria, S. C., writes :

The fig will commence bearing the second year, and when five or six years old will produce from one to three bushels of fruit. We dry figs by making a thin sirup of sugar and heating this and immersing the figs for a moment. Strain through a collender and roll in dry starch, then dry in sun. This is done at little cost, and makes a dried fig superior to the fig of commerce.

Mr. LEON ARCHIUS, Helena, Ark., writes :

The fig begins to bear the second year, but the yield is not very great until the tree is five or six years old, when the yield will average a peck to each tree every day for a month or more.

Mr. W. A. WHITFIELD, Bay Saint Louis, Miss., writes :

The young plants begin almost immediately to bear. I have gathered ripe figs in August from cuttings planted the previous January. There are two crops in each year. The yield is very large. In this climate the tree is without an enemy. Thousands of dollars could be saved the country by a little enterprise in economizing the wasted figs in drying them.

Mr. P. J. BERCKMANS, Augusta, Ga., extensively engaged in fruit-culture, writes as follows in regard to the process of drying figs, as practiced in that State :

I give herewith a method for drying which was quite successful with us several years since, but now that improved apparatus for drying are easy to be had, figs can be dried with comparative facility. Gather the figs when the skin begins to crack (this is a sign of maturity, and then the fruit contains the largest amount of saccharine matter). Make a strong lye of oak ashes, or take common cooking soda dissolved in hot water. Dip the figs in the hot liquid, only leaving them in this for a few seconds; expose immediately to the air for a minute or two, and repeat the dipping a second time. If the lye is hot and strong enough the color of the fig will immediately change, the dark-skinned varieties to a dark green, and the light-colored varieties to a pale-green. The object of dipping the fresh figs in hot lye or a solution of bicarbonate of soda is to kill the milky juice and thus hasten the drying. A small basket loosely made so as to allow the liquid to come freely in contact with the fruit is always desirable to be used for dipping. Place the figs upon trays made of wooden slats, and expose to full sun, taking the fruit under cover at evening, as it will spoil if dews fall upon it. The fruit must be turned in the sun every day, and in three to four days will be ready to put away in small wooden boxes, first putting a layer of spice-laurel leaves (*Laurus notilis*) at the bottom and covering the top with another layer of these leaves. Place the lid on tight to keep insects out, and keep in a dry room. If a brick oven is convenient it will facilitate the work and hasten the drying, but care must be taken not to give it too much heat. If the fruit secretes sirup it has been put under too high a degree of heat, and the result will be an inferior article. After the fruit is partially dried it should be lightly pressed with the hand so as to flatten it. Light-colored varieties are preferred for drying, as they are usually of more attractive appearance when placed in boxes, but the Celestial and Brown Turkey are much richer in quality, although presenting a darker and less attractive appearance. The Celestial dries the most readily of all our varieties, but makes the least valuable article as regards quality. The Brunswick, being very large, seldom gives good results with ordinary means, but will doubtless be easily managed with improved drying apparatus.

Through the courtesy of the Department of State this department has been placed in possession of valuable information in regard to the culture, &c., of the fig in those countries where it is grown and the fruit prepared for commerce.

The Hon. JOHN MEREDITH REED, United States minister at Athens, Greece, writes to this department as follows :

In reply to your communication of the 10th of December last, I have the pleasure to inclose the translation of a statement concerning the method of drying figs in Greece, which I derived from large fig cultivators and exporters. Figs to the amount of about \$500,000 are annually exported, principally to Austria.

Translation of statement on the method of drying figs in Greece.—The gathering of the figs commences about the 5th of August of each year. The ripe ones are cut from the stem by a reed, split at one end. The gathering continues for several days, as only the ripe ones are cut. After the figs are cut they are placed in a line, with great care, upon the ground to be dried by the sun's rays. The soil upon which they are put is divided into oblong sections 39 inches in width. At each side of every section there is a ditch to receive the occasional rain that may fall. On this account also the surface of each of the sections is higher in the middle and declines slightly toward either side. The sections, before the figs are put upon them, are strewed with a very fine kind of grass, upon which the figs are placed. After the figs are put in line upon the grass, as above described, and they have remained exposed for about four days, they become dry on one side, and they are then turned with care to the other side. At least eight days are required for drying figs properly. When they are thoroughly dry they are strung upon rushes to the number of fifty or sixty each, and are placed in boxes. They are sometimes, but very seldom, put into boxes without this arrangement.

In the islands of the Ægean Sea figs are dried in ovens.

The United States consul at Smyrna furnishes the following information in regard to the culture and preparation of the fig in Turkey :

Cultivation of the fig in Turkey.—*Climate.*—The Aidin district is the only one which produces figs for exportation. The fruit will grow anywhere in the neighborhood of Smyrna, of a good quality for consumption in a green state; but the Aidin plain is unique in its climate and soil as being favorable for the proper curing of the fig. The thermometer seldom falls below three or four degrees under freezing-point, and in the summer seldom rises above one hundred and thirty Fahrenheit in the sun.

In Aidin the winters are generally wet, the dry weather commencing in May and continuing to the end of October. Any rain the end of July or during the months of August and September, when the fruit is under the process of drying, injures the quality by causing it to burst, hardens the skin, gives the fig a dark color, and spoils its keeping quality. Heavy dews will cause the same evils. What is required during the time the fruit is coming to maturity is fine weather and dry winds.

Soil.—The fig-tree will grow in almost any soil. It grows very luxuriantly, however, in a rich, heavy soil. But to produce figs that will dry well and please the merchant the soil ought to be of a good depth and of a rich, light, sandy nature. This latter, if the weather is favorable, will produce large figs of a white, thin skin, and of the finest quality.

Preparation of soil.—Before planting, the ground ought to be well plowed two or three times to a good depth, well fertilized, and freed from all weeds and extraneous roots.

Cultivation.—The fig is propagated from slips, selected with as many fruity buds as possible. To form a tree, two slips are planted, one foot apart, and then joined at the top. The trees, if planted in rich soil, should be placed about 30 feet apart, and for poor soil about 25 feet distant from each other.

Rule.—The cuttings are to be planted in the month of March, two in each hole, at about 9 or 12 inches apart at the root end, and gradually bring the top buds to meet, and just cross them, thus, X; then tread in the earth well. The cuttings must be full of buds or eyes, and when about to plant cut the root end off at the first knot, care being taken not to have any of the pulp showing, as it will then be liable to be attacked by worms, which will make the tree hollow and sickly. The entire cutting is put into the ground to within one or two inches of the top; the process of crossing must then take place. Afterwards the ground must be well trodden in, to one or two inches of the top, then cover the remainder (say the one or two inches) over with loose earth, which will protect the ends from the heat of the sun. When

the trees arrive to about the height of a man, nip or cut off the tops to one uniform height, and this will cause the tree to branch out.

During the growth of the trees, the ground ought to be plowed up two or three times during the winter or spring, and the space between them may be used to cultivate cotton, sesame, or Indian corn. When the trees are large the same system of plowing and loosening the earth all around the trees ought to be continued. To make a fig-tree grow well the plowing of the garden is very essential, and if this is not attended to the fruit will be small and in every way inferior. The first year of planting, the cuttings ought to be watered during the summer months.

Application of the male fig.—About the middle of June the male fruit contains a large number of small flies, and is thrown on the female trees. These flies then get distributed over the fruit and convey the necessary amount of pollen. The system is as follows:

When the female fig (first crop) is about the size of a hazel-nut, five or six of the male figs are strung on to a piece of string and one or two of these bunches are thrown on to the female tree, according to its size and amount of fruit. Repeat the operation when the second crop is about the same size. As the tree grows larger year by year, increase the number of strings; but never put more than six strings (say about thirty male figs) over the largest tree at one time. These strings are put on the tree about one hour before sunrise, and care must be taken that the weather is fine and no wind blowing. I may mention that if the male fig is not applied the crop will not set, but the fruit will fall off, and if too many are applied the fruit will likewise fall or become very small and inferior.

Curing.—About the end of July the first figs come to maturity. The fig harvest lasts about six weeks. When the fig is ripe it will, of its own accord, fall from the tree only partly cured. Women and children are employed to pick up the fruit into small baskets to be conveyed to a place in the garden well exposed to the sun, where they are spread on a bed of dry grass, or matting, singly, that is to say, not one on the top of the other, and are turned every day, so as to get every side of the fig exposed to the sun. After a few days of exposure to the sun, those figs which are considered sufficiently dry are selected from the mass and divided into first, second, and third quality. Care must be taken not to dry them too much. The skin ought to feel dry, but the inside soft. Practice alone can teach to what extent the drying ought to take place. The grower then sends the figs to Smyrna, where they are assorted and packed for shipment.

On arrival at Smyrna they are conveyed to the fig bazaar or market place, where early each morning the merchants betake themselves to effect purchases. The parcels belonging to each individual owner are separately examined, each purchaser giving his own price. A broker is nearly always employed as an intermediary by the merchant, on the payment to him of 2 per cent. of the value, this amount being ultimately refunded by the seller. The seller is but seldom the owner himself, this latter being generally represented by a Jew or Armenian merchant, at an exorbitant charge of 7 per cent. as a commission.

The figs are now conveyed to the packing-establishment to undergo manipulation and boxing. The sacks are emptied out on the floor in a square heap, and on all sides are squatted rows of women and girls employed in merely twisting round each fig two or three times between the forefinger and thumb, to render it soft and give it its required oblong form. On the heap are a row of low baskets, into which are thrown separately the first and second qualities to be used for packing. At least 10 per cent. of the whole mass is worthless for boxing, and during the above process the inferior fruit is picked out and thrown in a separate heap. Undersized, tough, or spotted figs, and such as are burst, come under this category, and are packed, or rather pressed promiscuously, in small boxes and labeled, "Figs for family use." Sometimes, when the parcel is unusually good, three qualities are selected instead of two.

From this compartment the baskets are now conveyed to another, and laid on long benches, at which are seated the practiced packers. Each man has a box before him, and swiftly and dexterously are the figs placed alongside each other in rows. The rows vary in number according to the depth of the box, the flat ones, which are in more general use, requiring but two. This mode of packing is called "pulled." Above all, a row of "layers" is then placed to show the figs to advantage. The "layers" are stretched out by means of both hands and laid flat, side by side, in parallel rows. Of late years "layers" throughout the

boxes have come into great demand, and nearly all the best qualities are packed in this way. In packing, the fingers are now and then dipped into a bucket of sea-water to ease their working. The figs become thus moistened with salt-water, which, it is pretended, hastens their sugaring. The boxes are again passed on to the women, who complete the process by placing laurel leaves between the upper rows, before the final nailing down and polishing off by the carpenter. By following this method the fig is so stretched out that it opens at the end, but that part is concealed from view by being turned underneath. When treated in this way the air enters into the fig, and in a short time renders it dry and unpalatable, compared with fruit treated as "pulled," so that, while giving the fig a better appearance, it destroys its juiciness and flavor. The foreign market is in fault here, and not the Smyrna packers, who must suit the tastes of their customers.

The packages used are of various dimensions and forms. At one time all this fruit exported to the United States was placed in drums or paper boxes, but of late years flat wooden boxes are being extensively shipped. Very few drums, if any, find their way to the English market, to which the best qualities are usually sent. America consumes but little of the superior qualities, though the demand for such has now increased. Small canvas bags are now being used with success, and, in fact, every season some novelty in the style of package may be noticed.

The refuse, or "naturals," are put into large boxes or barrels, and are shipped to England, Egypt, and European Turkey. The high rate of duty in America excludes these inferior figs altogether from her markets.

The United States consul at Beirut, Syria, writes as follows of the preparation of figs:

There are several kinds of figs produced here, of which the white, or sugary fig, is considered the best to be dried, as it contains the most saccharine matter. The other kinds are consumed fresh during the season. The white figs are allowed to become fully ripe upon the trees before they are gathered by hand.

The gathering usually takes place during the latter half of August along the coast, and in September in the mountains. Dry and clear weather is chosen. When gathered, the figs are spread upon the flat tops of houses or in inclosures, upon mats made of cane or grass, and exposed to the sun for seven or eight days. They are then put together and separately pressed between the thumb and fingers, and again spread upon the mats and placed in the sun for two or three days. Great care should be taken to keep them from dirt, dust, &c.

When sufficiently dried as above, the figs are placed in grass baskets and held over caldrons of boiling water until they perspire, as it is called. The fig is peculiarly liable to become moth or worm eaten, and the object in exposing it to the effects of steam is to kill any animal germs that it may contain. This is the most delicate part of the whole process of preparation, and requires some tact and experience, as too great exposure to steam would deprive it of more or less of its saccharine matter, and an insufficient exposure would not prevent its becoming worm-eaten.

Lastly, the fruit is again aired in the sun and dried, and packed, with slight pressure, in boxes or baskets, and kept as much as possible from the air until opened for winter-use.

Dried figs and raisins form an important element of the food of most of the people of this country, as they are too poor to buy sugar, and a very large proportion of them use little or no animal food.

The United States consul at Cadiz, Spain, writes as follows:

I have the honor to inclose you the directions for drying figs, requested in your dispatch of December 10, 1877.

Directions for drying figs.—The figs must be ripe, indeed, past maturity; then they must be put on dry boards separated from each other so that there is no contact whatever. This process must be continued for six or seven days, taking care always that the figs be not exposed to moisture or dampness. When this process is ended they must be put in the frails or boxes and pressed. There is no necessity of turning them over as in the case of raisins or other fruit. The process is very simple, and no other labor is necessary than that described above.

The United States consul at Messina, Italy, writes as follows:

In reply to your letter of 12th December last, asking information in regard to the drying and preparing the native figs for market, I have to inform you that the method employed by the peasantry is very primitive and crude. It is as follows:

When ripe the fruit is halved, but not entirely separated at the stalk, spread open and laid upon mats woven from cane. These mats are in most cases placed upon a light frame-work, some four or five feet above the ground, and in a position to have the rays of the sun all the day. In this climate the fruit is considered sufficiently cured in eight or ten days' exposure. The mats are taken in after sunset and care is taken that no moisture affects them. When perfectly dry, the figs are placed upon two sharpened sticks of split cane of about one foot in length, by pushing the sticks through each half. They are then placed upon the market for sale.

Very small quantities are sent from this port to America or elsewhere, nearly all the crop being consumed here.

THE DATE PALM.

The Date Palm is a hardy tree, as are all the species of palms, and flourishes throughout an immense space in the countries where it is grown, embracing a wide area, lying between and running from 12° to 57° of north latitude.

It has been introduced successfully into Southern Europe, and thrifty specimens may be seen growing in England, without apparent injury from the rigour of that climate. There are fine specimens of this valuable tree in the gardens at Saint Augustine and at Key West, Florida, and in Louisiana, near New Orleans, in vigorous growth, and perfecting their fruit, which is evidence that this palm will grow elsewhere in the United States in latitudes and conditions of climate, similar to those of its native countries.

Contributing, as it does, to many of the essential wants of man, it is not only one of the most useful, but also one of the most picturesque and beautiful trees in the vegetable kingdom.

The Date Palm, according to botanists *Phoenix dactylifera*, is cultivated in immense quantities all over the northern part of Africa, and more sparingly in Western Asia and Southern Europe; and in some of these countries its fruit, though only known to us as an article of luxury, affords the principal food of a large proportion of inhabitants, and likewise of the various domestic animals—horses, dogs, sheep, cows, and camels being alike partial to it.

The tree usually grows about 60 or 80 feet high, and lives to a great age, trees of from one hundred to two hundred years old continuing to produce their annual crop of dates. Numerous varieties are recognized by the Arabs, and are distinguished by different names, according to their shape, size, quality, and time of ripening. The fruit, however, is not the most valuable part of this widely dispersed tree, for, as with the cocoa-nut tree in its native country, nearly every part is applied to some useful purpose. Bags, mats, couches, brushes, and the huts of the poorer classes are constructed of its leaves. The fiber surrounding the bases of their stalks is used for making ropes and coarse cloths, the stalks themselves for crates, baskets, brooms, walking-sticks, &c., and the wood for building substantial houses. The heart of young leaves is eaten as a vegetable. The sap affords an intoxicating beverage, though, to obtain it, the tree is often destroyed; and even the hard and apparently useless stones are ground into food for cattle.

The stem of the tree, which is straight and simple, reaches a height of 60 feet, and bears a head of forty to eighty sea-green, feather-shaped leaves, of 8 to 10 feet long. This palm being dioecious, that is, the stamens and pistils, or male and female parts, occurring in the flowers of different trees, the crops fail, or the fruit is unfit for food and worthless if the fertilization is in any way

prevented. To insure this, it was an early custom of the Arabs to hang clusters of male flowers on the trees which bore only the female ones. And thus the Date Palm was one of those trees which led to the knowledge of the sexes of plants.

The fruit grows in clusters, and a tree will bear usually fifteen or twenty clusters, each weighing fifteen or twenty pounds. The fruit is eaten either fresh or dried, and in the latter state becomes an article of commerce. Generally, the fruit may be described as oblong, somewhat the shape of an acorn, but about twice the size, consisting of a thick, fleshy substance, including, and freely separating from, an oblong stone or kernel, having a furrow on the one side. Their taste is agreeably sweet, accompanied with a slight astringency. Chemical analysis has discovered that the fleshy part of the fruit contains fifty-eight per cent. of sugar.

When the dates are allowed to remain on the tree till they are quite ripe, and have become soft and of a high red color, they are formed into a hard, solid paste or cake. This is formed by pressing the ripe dates forcibly into large baskets, each containing about two hundred weight. In this state it is exported, and in the market it is cut out of the basket and sold by the pound. It forms part of the daily food of all classes of people. In traveling, it is dissolved in water and thus affords a sweet and refreshing drink. Cakes of dates, pounded and kneaded together, and so solid as to be cut with a hatchet, are the store of food provided for African caravans on their journey through the Great Desert.

A liquid resembling wine is made from dates by fermentation, and also a kind of vinegar. In Persia an ardent spirit is distilled from dates. The soft pith at the summit of the palm-stem, along with the young leaves not yet unfolded, are eaten under the name of palm-cabbage. From the central pith of the tree a starch of nutritive properties is also made. Many of the inhabitants of Northern Africa use the roasted date stones or seeds as a substitute for coffee. In the Barbary States they make handsome beads for rosaries of these seeds. The seeds are in many places ground for the sake of the oil which is afterward obtained from them by expression, and the refuse is given as food for cattle. As food for cattle, sheep, &c., the seeds of the date, softened by being soaked in water, are considered in the East to be more nutritious than barley.

It is said by travelers that all the refinements of Arabian cookery are exhausted in the preparation of dates, and that a good housewife will daily supply her lord for a month with a dish of dates differently dressed.

In ancient times the Date Palm was held sacred to the sun, and its leaves were used as emblems of authority and glory. They were hence carried before kings and conquerors. The Date, it is written, was probably the Palm which supplied the "branches of palm-trees," mentioned as having been carried by the people who went to meet Christ on his triumphal entry into Jerusalem, and from which Palm Sunday takes its name.

The best dates imported into Great Britain and the United States come from Tunis and Algiers, but they are most commonly brought from Smyrna and Alexandria. The author of "Tropical Agriculture," an English publi-

cation of great merit, says that although the countries where the date flourishes best are characterized by an absence of rain, it will not fruit without its roots are well watered. Hence there is a native proverb that the date must have its head in the fire and its roots in the water, proving the necessity of frequent irrigation.

In Algeria and Tunis the culture of the date occupies a large surface of the land, and is carried on with great care. The fruit is of the finest quality, and its cultivation one of the profitable industries of the country. The best trees are those produced from slipped plants. Those raised from seeds are much longer in arriving at maturity. When the slip, taken from the root of the stem of an adult tree, is first planted, it must be watered daily for five or six weeks, and every other day for the next month. After this the trees are watered once a week in summer and every month in winter. In planting seeds they should be chosen from those fully ripe, having full large eyes, and such as have been gathered from mature trees and from clusters containing few fruits. These, if carefully planted, are said to ensure timely sprouting and steady growth, as well as future luxuriance, longevity, and unremitting fruitfulness. The seeds taken from old trees have small eyes, and the sprouts from such seeds will be thin and weakly. The seeds from very young trees are not good. It is best to plant in alluvial soil, and in situations where they can have sufficient moisture.

In a favorable situation the Date Palm will begin to fruit at six years, and lasts to a hundred years and more.

A date tree in full bearing will produce from two hundred to four hundred pounds of fruit a year.

Although there are so many varieties of the date, differing in size, form, and quality of the fruit, they may be chiefly divided by color into three classes, viz., red, yellow, and whitish.

The dates, after having been gathered, are dried in the sun, and may thus be preserved for about two years.

In Turkey each proprietor has a right to two hours' water in the day from the stream which passes by his grounds, and this right is always specified in the title-deed by which he holds his garden. Before the dates are ripe each family is bound to set apart one tree, all the fruit of which is consecrated to the service of the Mosque and the use of the poor.

From the juice or sap of the tree there is made a fermented wine or liquor, of which the natives are very fond. It is produced by simply making an incision in the top of the tree, below the foliage, reaching the center. A tube is fitted, through which the sap flows into a vessel. The palm thus yields about ten quarts every day. The tree is bled every two months, sometimes every day, to prevent the healing of the wound. The operation will kill the tree if continued too long, but cautiously practiced for a few days will often invigorate a sickly or ill-bearing palm.

Sugar and molasses are also made from the sap, and by about the same process as is employed in the Northern States in the manufacture of maple sugar and sirup.

It is estimated that in Egypt there are 4,000,000 Date Palms grown, and the annual production is about 15,000,000 or 20,000,000 cwt., the most of which is locally consumed. In Tunis, according to a recent enumeration, there are about 900,000 date-trees which are subject to a tax by the government. The annual product of these trees is valued at \$2,435,000.

The date-groves of Turkey yield annually from 40,000 to 60,000 tons of dates, in ordinary good seasons.

Burckhardt, in his travels in Arabia, says that the dates form the principal part of the subsistence of the inhabitants of many portions of Arabia and the Barbary States, and they are held in the highest estimation wherever they are met with; that they are by far the most essential article of food for the people. Their harvest is expected with as much anxiety, and attended with as much general rejoicing, as the vintage in the south of Europe.

The chief resource of the inhabitants of the oases of the Sahara is the Date Palm. When every other species of fruit fails, the Date Palm yields with the returning year its nourishing fruit, and often saves the populations of the Great Desert from starvation.

Sufficient experiments have already demonstrated that in two States (Florida and Louisiana), without especial attention to culture or situation, the Date Palm will grow well and thriftily, and perfect its fruit to a degree comparable with the dates of Egypt or Turkey, which is good foundation for the belief that this valuable tree will grow and thrive in other States of like conditions of climate, latitude, &c.

The alluvial lands along the river courses of Southern Alabama, Louisiana, Mississippi, and Texas it is believed will grow the date. Notably the bottom lands of the Tombigbee, the Pearl, the Mississippi, the Sabine, the Brazos, the Nueces, the Colorado, and the Rio Grande Rivers, where there is abundant moisture for the roots and warm sunshine for the stems, and where large tracts of lands, now neglected and unproductive, could be made attractive by the cultivation of the Date Palm, and profitable to the proprietors for long years to come.

Gen. Charles P. Stone, of the general staff of the Egyptian army, Cairo, writes in regard to the date:

I have the honor to acknowledge the receipt of your letter of the 3d instant, informing me of the safe arrival and planting of the red-date seed, &c.

Had I known that you desired to plant the date tree in large numbers, the quantity sent would have been very much greater, and I have now given orders for the collection of several thousand seeds in each of the northern districts, where the best dates are grown. The provinces of Charkyeh, Garbieh, and Dakalieh, as well as the districts of Rosetta, all produce, in their northern portions, excellent varieties of dates, the cultivation of which is very profitable.

From what I have seen of the date-producing regions in this part of the world, and from what I know of the Desert of the Colorado, between Carisa Creek and Fort Yuma, I am inclined to believe that the greater portion of the latter region could be made productive and very valuable by there making plantations of the Date Palm. This tree not only does not require much water, but much water is prejudicial to it; and the climate of the Colorado Desert is singularly similar to that of some of the best date-producing districts here. In any case, I feel assured that all the New River portion of the Colorado Desert would grow the date tree without difficulty.

Of date the 15th February, 1878, General STONE also writes from Cairo, Egypt:

I have the pleasure of sending you, by mail, a small sack of date-seeds, of a choice and hardy variety, called *Amsi*, grown in the province of Charkieh, latitude about thirty-one degrees north, where, during the winter, the cold is sometimes quite sensible.

I am told that it is best to plant the seeds with the grooves down. I am also informed by those acquainted with the culture that one is not sure to produce from the seed the same quality of date as that planted, in size, flavor, &c., but, on the contrary, the product is usually inferior, while sometimes, but rarely, superior. When a date cultivator finds that a certain tree yields a remarkably good fruit, he is careful to preserve and transplant all the shoots of that tree which come from its roots, being sure that in those shoots he will have the same quality of fruit.

I propose to send you, by the next mail, a quantity of seed of another variety, also choice and hardy, from the coast between Rosetta and Damietta.

I suppose that you are aware that to have a good crop and good fruit it is necessary to mix, by hand, the pollen of the flowers of the male tree with that of the female.

Mr. J. R. SCUPHAM, assistant engineer of the Central Pacific Railroad, writes from San Francisco, and says:

I notice, through the public journals, that you are taking an interest in date-culture in California. I have been making some experiments in that line. For two years we have been planting various species of Eucalypti and Acaciæ along the right of way, and on odd sections throughout the State. I have been experimenting to get a tree that will stand the heat and drought of the Mojave and Colorado Deserts. Among others, I have tried the Date Palm (*Phoenix dactylifera*), and find that it will stand the slight frost to which the desert is subject, even better than the Eucalypti. To get my specimens, I simply took the seed from the dried dates of commerce, and find that they will grow very well. I intend to experiment further with them, in the vicinity of Yuma, this coming season.

DEPARTMENT OF AGRICULTURE.
SPECIAL REPORTS—No. 5.

REPORT

UPON THE

CONDITION OF CROPS

JUNE 1, 1878.



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1878.

JUNE REPORT OF GROWING CROPS.

WINTER WHEAT.

An open winter is usually unfavorable for fall-sown grain. The last was exceptional in uniting uniformity with mildness: 'The spring was early, with few alternations of temperature. In the West and Northwest the season was reported from two to three weeks earlier than usual, most returns naming three weeks. In the South the difference was one to two weeks.

In March and April remarkably high condition was quite general. The ground was thickly covered with plants of vigorous appearance. The weather was favorable to rapid growth. As the temperature increased, with a moist atmosphere, conditions which favored the prevalence of rust, fears were entertained of great losses from this fungus, which became more or less general through the winter-wheat region, coming earlier and proving more injurious in the South, especially in Tennessee. It was confined to the blades, blighting first those nearest the ground. It was more general in bottoms than on uplands, and far more prevalent in southern than northern latitudes. In many places wholesale destruction was feared. Then came the frosts and cold storms of May, which retarded development, and at the same time washed the rust from the blades. The resulting improvement, on the return of settled weather, was very general, and the losses apprehended have been nominal upon large areas, and far less than was expected upon the smaller districts more seriously threatened.

The cold storms also banished the Hessian fly in a great degree, which had already done some damage, and had threatened more serious losses.

This is in brief the general history of the crop, brought up to the time of harvest, which is already over in the more southern States, and coming on in the North at an earlier date than usual. Returns from 1,006 counties producing winter wheat make the condition of the crop 98 (100 representing normal growth and development, without impairment by defective stands, injuries from meteorological causes, or results of neglected culture). Of these, 411 are above this standard and 404 below it, but the latter represent a larger area of the crop. The States making the most favorable returns were New York, Maryland, Pennsylvania, Texas, West Virginia, Ohio, Michigan, Indiana, and Kansas. Winter wheat is in high condition in the Northwest, but it represents an inconsiderable fraction of the crop in those spring-wheat States. In the States between Maryland and Texas condition is comparatively low.

In Texas it is 103. A growing confidence in the profit of wheat culture has greatly extended the breadth of this cereal in Texas; in the rich soils of the central wheat belt the change is very marked. In some counties the increase

is twofold. Wheat has this year been sown for the first time in some of the southern counties below the latitude of 30° . The harvest in Texas commenced early—in some cases as early as April 17. The yield is unusually heavy. In Travis County a few fields have produced 31 bushels per acre, average yield 18; in Kaufman the average yield is 18 bushels; in Bastrop the yield ranges from 15 to 30; in Ellis thrashers obtain 10 to 15 bushels; in Dallas, 15 bushels.

Tennessee, another prominent wheat region of the South, has a crop exceptionally poor, condition averaging but 66. The impairment was caused by rust and the Hessian fly, which were more prevalent and destructive than in any other State.

The States reporting high average condition are as follows: New York, 105; Pennsylvania, 109; Maryland, 106; Texas, 103; Ohio, 106; Michigan, 101; Kansas, 106. Those reporting low condition: New Jersey, 77; Delaware, 88; Virginia, 97; North Carolina, 82; South Carolina, 92; Georgia, 90; Alabama, 85; Mississippi, 85; Louisiana, 87; Arkansas, 64; Tennessee, 66; West Virginia, 98; Kentucky, 82; Indiana, 99; Illinois, 93; Missouri, 90; Oregon, 99.

The quality of wheat harvested is generally good; in Texas the berry is large and plump, in the other Southern States variable in quality; in Kansas and Missouri the head is large and unusually well filled and the berry sound.

Some varieties distributed by the department for experiment have done well in new localities. The Golden Straw, in Grenada, Mississippi, growing six feet in height, with long heads, was little affected by prevalent rust, and is reported to have yielded at the rate of 65 bushels per acre.

The increase of average of winter wheat is remarkable. The principal reason for the enlargement of area has been the high price of wheat during the European scarcity, notwithstanding the heavy crop of last year, while the price of corn has declined under the pressure of three large crops in succession.

The increase apparently amounts to one-sixth of last year's acreage, or at least two and a half million acres. It is proportionally largest in Kansas, amounting to nearly 400,000 acres; there is an increase of more than 300,000 in Illinois, and great enlargement of breadth in Indiana, Missouri, Ohio, Michigan, Texas, Tennessee, and other States.

The Hessian fly is reported at work from New York to Georgia, in Tennessee and Arkansas, throughout the Ohio Valley, though the infliction has been so slight that only a few counties in each State report its presence. In no States has it reduced the average of condition perceptibly, except in Tennessee, and in a less degree in Arkansas and Virginia.

SPRING WHEAT.

The early opening of spring has given a long season for the sowing of spring grain, resulting in an extraordinary increase in acreage. Returns have been received from the larger portion of the spring-wheat area, the results of which may be slightly modified by further data from area now unreported. So far the comparison stands with last year as follows: Wisconsin, 117; Minnesota, 130; Iowa, 125; Nebraska, 140. The northern borders of Illinois,

Missouri, and Kansas, which have a small area of spring wheat, also make an increase, Kansas of one-third, and Missouri of one-half.

This would indicate an increase approximating two million acres of spring wheat.

The oldest reporters and earliest settlers of this district state that the past has been the mildest winter and earliest spring known in an experience ranging from twenty to forty years.

The condition of the crop is very high. The averages of condition are reported as follows: Illinois, 104; Wisconsin, 110; Minnesota, 106; Iowa, 110; Nebraska, 113; Kansas, 100; Missouri, 93.

Statements from several counties in the Texas wheat region report the trial of spring planting with favorable results. In some places the practice is growing in favor, from experience of two or three years past. It is scarcely known in other portions of the South, although it has been occasionally tried in some of the higher altitudes.

RYE.

Winter rye is also increased in area, and in good condition. The lowest expression of condition is 88, in Arkansas. Thirteen States average between 90 and 100, and the remainder higher, in which are included all of the Middle and Ohio Valley States. The average is 102.

OATS.

The increase in acreage of oats, as reported, is 9 per cent. It is largest in the Southwest and west of the Mississippi.

In condition the oat crop is relatively higher than wheat, the general average being 103. The early spring was very favorable, and the injury from rust was largely obviated by the cool weather of May. It is becoming an important crop in the South, where it is especially needed, corn being too heating for exclusive horse feed in the heat of summer, and is now a comparatively reliable crop, by reason of growing in winter and a selection of rust-proof varieties. Of the 1,104 counties reporting condition of oats, only 201 return less than 100. The analysis of returns is as follows:

States.	100.	Above 100.	Below 100.	Total counties.	States.	100.	Above 100.	Below 100.	Total counties.
Maine.....	6	2	1	9	Texas.....	19	21	17	57
New Hampshire..	5	2	.....	7	Arkansas.....	8	14	8	30
Vermont.....	.....	7	2	9	Tennessee.....	18	8	8	34
Massachusetts.....	3	1	.....	4	West Virginia.....	14	22	3	39
Rhode Island.....	2	1	.....	3	Kentucky.....	18	16	5	39
Connecticut.....	2	1	.....	3	Ohio.....	30	22	7	59
New York.....	11	12	9	32	Michigan.....	22	7	11	40
New Jersey.....	3	2	2	7	Indiana.....	22	12	9	43
Pennsylvania.....	18	26	5	49	Illinois.....	19	35	8	62
Delaware.....	2	1	.....	3	Wisconsin.....	13	16	3	32
Maryland.....	5	9	2	16	Minnesota.....	19	15	4	29
Virginia.....	28	34	12	74	Iowa.....	21	27	2	52
North Carolina.....	18	21	16	55	Missouri.....	28	23	7	58
South Carolina.....	6	5	6	17	Kansas.....	16	14	1	31
Georgia.....	44	25	19	88	Nebraska.....	14	11	1	26
Florida.....	3	10	8	21	California.....	5	5	2	12
Alabama.....	3	6	.....	9	Oregon.....	1	2	2	5
Mississippi.....	5	14	11	30					
Louisiana.....	1	9	1	11					
					Total.....	445	458	201	1,104

BARLEY.

Like other cereals, barley is in high condition, the general average being 102. The number of counties reported is 410, of which 225 are placed at 100, 67 below that standard, and 118 above. Very little is grown in the South, where it is rarely mentioned in reports (see table).

The acreage appears to be about the same as last year. In the districts reported the general average, in comparison with last year, is 98, or 2 per cent. less.

CORN.

As this crop is not all planted in northern latitudes on the first of June, returns of acreage are not included in the June circulars. Voluntary notes of its condition are favorable throughout the South. In the Northern and Western States the condition is less favorable. The warm weather of April encouraged early planting in the central belt, while the succeeding cool and wet season either caused the seed to rot in the ground or impaired the vigor of the young plants and retarded their growth. Replanting of considerable areas was required. It is not enjoying favorable conditions for a vigorous growth in the higher latitudes, and must depend upon future conditions for successful development.

COTTON.

The returns indicate an increase in the area planted in cotton. The percentages, as compared with the acreage of 1877, are: Virginia, 100; North Carolina, 101; South Carolina, 103; Georgia, 102; Florida, 100; Alabama, 104; Mississippi, 100; Louisiana, 101; Texas, 106; Arkansas, 98; and Tennessee, 98. The condition of the crop is better than in June of last year. The figures indicating it are the same as in 1877 in Virginia, Georgia, and Louisiana, and higher in all the other States. They are as follows: Virginia, 88; North Carolina, 87; South Carolina, 99; Georgia, 101; Florida, 98; Alabama, 101; Mississippi, 98; Louisiana, 98; Texas, 104; Arkansas, 98; Tennessee, 97. The general average of condition is 99. The stand is generally good. In limited districts it is imperfect, in consequence of the planting of seed of impaired vitality. The season is earlier than the last by an average of ten days. In some districts the crop is no further advanced than usual at this date. In a few localities a difference of from three to four weeks is claimed in favor of the present crop. The comparatively low condition in North Carolina is due to wet weather and cool nights. In South Carolina and Georgia planting was unusually early, with seasonable weather until the first week in May, since which time there has been little rain, and drought is generally reported. In several districts in Georgia the best prospects for many years is claimed. In Mississippi, Louisiana, and Arkansas rains have been frequent, and in some districts injuriously heavy. Very favorable weather has been enjoyed in Texas. Few insects are reported. The cut-worm was a partial cause of defective stands at many points on the Atlantic coast, and plants are beginning to be infested with lice in limited areas west of the Mississippi. The injury has been very slight. Fields are unusually clean in culture, and labor is increasing in efficiency.

FRUIT.

The blossoming of fruit-trees was necessarily early, and the promise of fruit was good until the occurrence of May frosts, which wrought more or less injury throughout the country.

Apples.—Average low in prospect in all the States, except in New England, New Jersey, Texas, Ohio, and California. In high latitudes the development of this fruit was too late for injury from the frosts of May. In that section good condition of growth was quite uniform, all the States presenting high averages. Among the favorable indications of the crop were the abundant bloom, its pale color, and long continuance upon the trees—in one county three weeks. In the Middle, Southern, and Western States the crop was not so fortunate. The heavy frosts did more or less damage, especially to the earlier varieties. In many favored localities local causes counteracted the general tendency to disaster, and such have a prospect of abundant crops. From different Southern and Western States come a few reports of blight, the limbs of trees dying and the green fruit falling.

Some counties in Texas felt the withering breath of hot winds, while in others there was injury from hail-storms. Yet in this State the general condition of the crop was considerably above an average. From the States north of the Ohio River came a few complaints of sparse fruitage following abundant bloom. In some cases this was due to the action of frosts, but in others it could not be so accounted for. In the Lake region the injury from frost was light. West of the Mississippi it is noticeable that the crop is better in the higher latitudes and more elevated regions, where the frosts were over before the blossoms appeared. On the Pacific coast, California is above average and Oregon below.

Peaches suffered from the May frosts, especially in those States where their culture has been a specialty. In the more northern States, to the east and west, the crop is small, but reported favorably. In the belt including the Middle States and the regions north of the Ohio River the crop was mostly below average, but in Ohio and Illinois it was considerably above. In very many counties of this region the promise of the crop is very superior. In the South the crop is above average, except in South Carolina and Florida. It is remarkably good in Tennessee. Several counties in Alabama and Mississippi report the best prospects for many years. In Texas, peaches as well as apples suffered from hot, wasting winds in some counties, and from hail in others; but these injuries did not prevent the crop from being considerably above average. West of the Mississippi the condition is uniformly high—highest in the small crop of Nebraska. On the Pacific coast, California falls about one-eighth short of an average, while Oregon is less than one-half.

Insect injuries were insignificant in number and range. In Beaver, Pennsylvania, and Prince George's, Maryland, an unknown insect destroyed the outside branches of apple-trees and caused the fruit to fall. In Mississippi, the caterpillar is noted as somewhat injuring apples, while in one county the curculio was found among the peaches.

MAPLE SUGAR AND MOLASSES.

This branch of production in the past season about equaled that of the preceding one in New England and Minnesota, but everywhere else it fell. In the North Middle States it declined from one-eighth to one-sixth. In the South it was reported only in Virginia, West Virginia, Tennessee, and Kentucky, and in these States almost exclusively in the mountainous regions. Virginia nearly equaled her previous product of sugar, with a somewhat smaller proportion of molasses; in the other three States the decline ranged from a fifth to a fourth. North of the Ohio, the decline ranged from one-sixth in Michigan to one-third in Illinois and Wisconsin. West of the Mississippi, Minnesota increased her product, but Iowa fell off a third, and Missouri about two-fifths. Kansas, Nebraska, and the Pacific States report no production.

LIVE STOCK.

The conditions affecting animal vitality have been exceptionally favorable. Cows came out of winter quarters in superior condition in all the States without exception, a fact fully accounted for by a mild winter, with abundance of forage. In many sections grazing was good during the fall and a large portion of the winter, while the early starting of spring pastures shortened the period of winter feeding in all the States. A marked exception to this general fact is seen in Humboldt, California, where 25 per cent. of the yearling cattle were lost through exposure.

The condition of sheep was most favorable in New England, the North Middle States, and the northern portions of the Mississippi Valley. The losses during the past year range from 4 to 6 per cent., New Jersey reporting 7 per cent. and Missouri 9 per cent. In the Southern States these losses ranged from 8 to 12 per cent. On the Pacific coast California lost 14 per cent. and Oregon 7 per cent. In numerous instances, especially in the South and West, the greater portion of these losses were ravages of dogs. In some of the frontier counties wolves attacked the flocks. The value of a dog-tax is seen in Augusta, Virginia, where the value of 175 sheep killed by dogs in 1877, amounting to \$950, was paid out of a fund raised by taxing dogs. During the previous year, when no such law existed, the number of sheep killed was 320.

SPRING PASTURE.

The moist cool weather of May following the open winter and fine weather of early spring, has imparted a universal stimulus to the growth of grass crops. Our returns show a condition above average in every State in the Union except South Carolina, where the rain-fall has been rather stinted during the late portion of spring. The increase is generally distributed throughout the different sections of the Union, showing conditions of growth uniformly favorable. In a few cases grass was injured by frost, but not to any great extent. Its growth has been early, continuous, and vigorous.

CLOVER.

Acreage.—The acreage of clover has been increased along the whole Atlantic slope, except in New England, where it is probably equal to last year. Of the

cotton States all show an increase except Arkansas, which declines slightly. There is a marked increase, amounting to over 20 per cent. in Mississippi. Of the States of the Mississippi Valley, on both sides the Mississippi River, Ohio and Indiana equal last year's acreage, and all the others show an increase, amounting to 17 per cent. in Nebraska, 8 per cent. each in Iowa and Missouri. On the Pacific slope California reports an increase of 15 per cent. and Oregon 8 per cent.

Condition.—The condition of the crop is full average or above in all the States except Rhode Island, South Carolina, and Georgia, which show a small deficiency. The Middle States, the Valley of the Mississippi, and the Pacific coast show a high condition, ranging from 1 per cent. above average in Michigan to 12 in Maryland, and 14 in Nebraska. The New England States are a little above and the South Atlantic a little below average.

In some of the North Middle and Western States the heavy frosts of May caught the plant at a critical period, and some temporary injury was inflicted, but in many such cases it is reported that the crop was rallying under subsequent improved conditions of growth. In several sections of the South and West, and on the Pacific coast, it is noticed that increased attention is given this crop, and in many counties it is superseding commercial fertilizers. From Texas, South Carolina, and other Southern States come reports of the California or burr clover (*Medicago denticulata*). This crop has been lately introduced in those sections, and furnishes a fair grazing material during the winter and spring, but it dies down during May, and constitutes a drawback to wool-growing from the fact that it leaves the fleece full of burrs and consequently depreciated in value.

STATES.	WINTER WHEAT.		SPRING WHEAT.		BARLEY.		OATS.		CLOVER.		SPRING PASTURE.		MAPLE SUGAR AND MOLASSES.		COWS.		SHEEP.		APPLES.		PEACHES.		COTTON.	
	Average condition June 1.	Average sown this spring compared with last.	Average condition June 1.	Average sown this spring compared with last.	Average condition June 1.	Average condition compared with last year.	Average condition June 1.	Average condition compared with last year.	Average condition June 1.	Average condition compared with last year.	Average condition June 1.	Product of sugar this year compared with last.	Product of molasses this year compared with last.	Average condition of cows this spring.	How many sheep in every hundred have been lost by disease or other casualties.	Average condition of the crop June 1.	Average condition of the crop June 1.	Average compared with last year.	Average condition June 1.					
Maine.....	86	111	101	101	96	100	96	101	101	101	106	101	101	101	5	117	99	100	100	100	100	100	100	
New Hampshire.....	95	104	107	106	103	103	99	104	97	103	112	103	101	103	4	112	99	100	100	100	100	100	100	
Vermont.....	100	101	100	100	100	100	99	100	100	100	110	100	100	100	9	106	100	100	100	100	100	100	100	
Massachusetts.....	104	107	100	100	100	100	100	100	100	100	115	100	100	100	5	100	100	100	100	100	100	100	100	
Rhode Island.....	100	100	100	100	100	100	100	100	100	100	109	100	88	85	100	5	100	100	100	100	100	100	100	
Connecticut.....	101	101	100	100	100	100	100	100	100	100	109	100	88	85	100	5	100	100	100	100	100	100	100	
New York.....	105	101	100	100	100	100	100	100	100	100	109	100	88	85	100	5	100	100	100	100	100	100	100	
New Jersey.....	77	101	98	95	102	100	99	100	97	100	109	100	82	83	100	6	100	100	100	100	100	100	100	
Pennsylvania.....	80	100	100	100	100	100	100	100	100	100	109	100	82	83	100	6	100	100	100	100	100	100	100	
Delaware.....	88	98	100	100	100	100	100	100	100	100	109	100	82	83	100	6	100	100	100	100	100	100	100	
Maryland.....	100	100	100	100	100	100	100	100	100	100	109	100	82	83	100	6	100	100	100	100	100	100	100	
Virginia.....	97	104	100	100	100	100	100	100	100	100	109	100	82	83	100	6	100	100	100	100	100	100	100	
North Carolina.....	82	94	100	100	100	100	100	100	100	100	109	100	82	83	100	6	100	100	100	100	100	100	100	
South Carolina.....	95	93	100	100	100	100	100	100	100	100	109	100	82	83	100	6	100	100	100	100	100	100	100	
Georgia.....	92	102	100	100	100	100	100	100	100	100	109	100	82	83	100	6	100	100	100	100	100	100	100	
Florida.....	90	101	100	100	100	100	100	100	100	100	109	100	82	83	100	6	100	100	100	100	100	100	100	
Alabama.....	85	98	100	100	100	100	100	100	100	100	109	100	82	83	100	6	100	100	100	100	100	100	100	
Mississippi.....	85	96	100	100	100	100	100	100	100	100	109	100	82	83	100	6	100	100	100	100	100	100	100	
Louisiana.....	87	100	120	103	97	100	100	100	100	100	109	100	82	83	100	6	100	100	100	100	100	100	100	
Texas.....	103	104	120	103	97	100	100	100	100	100	109	100	82	83	100	6	100	100	100	100	100	100	100	
Arkansas.....	64	88	100	100	100	100	100	100	100	100	109	100	82	83	100	6	100	100	100	100	100	100	100	
Tennessee.....	66	94	100	100	100	100	100	100	100	100	109	100	82	83	100	6	100	100	100	100	100	100	100	
West Virginia.....	98	107	100	100	100	100	100	100	100	100	109	100	82	83	100	6	100	100	100	100	100	100	100	
Kentucky.....	82	97	100	100	100	100	100	100	100	100	109	100	82	83	100	6	100	100	100	100	100	100	100	
Ohio.....	106	106	100	100	100	100	100	100	100	100	109	100	82	83	100	6	100	100	100	100	100	100	100	
Michigan.....	101	104	114	102	101	100	100	100	100	100	109	100	82	83	100	6	100	100	100	100	100	100	100	
Indiana.....	99	102	120	104	101	100	100	100	100	100	109	100	82	83	100	6	100	100	100	100	100	100	100	
Illinois.....	98	100	120	104	101	100	100	100	100	100	109	100	82	83	100	6	100	100	100	100	100	100	100	
Wisconsin.....	105	107	117	110	100	100	100	100	100	100	109	100	82	83	100	6	100	100	100	100	100	100	100	
Minnesota.....	108	106	130	106	102	100	100	100	100	100	109	100	82	83	100	6	100	100	100	100	100	100	100	
Iowa.....	112	106	125	110	102	100	100	100	100	100	109	100	82	83	100	6	100	100	100	100	100	100	100	
Missouri.....	93	99	146	93	96	100	100	100	100	100	109	100	82	83	100	6	100	100	100	100	100	100	100	
Kansas.....	90	96	100	100	100	100	100	100	100	100	109	100	82	83	100	6	100	100	100	100	100	100	100	
Nebraska.....	120	106	140	113	105	100	100	100	100	100	109	100	82	83	100	6	100	100	100	100	100	100	100	
California.....	96	103	106	90	100	100	100	100	100	100	109	100	82	83	100	6	100	100	100	100	100	100	100	
Oregon.....	99	102	103	101	98	100	100	100	100	100	109	100	82	83	100	6	100	100	100	100	100	100	100	

DEPARTMENT OF AGRICULTURE.
SPECIAL REPORT—No. 6.

REPORT

UPON THE

CONDITION OF CROPS

JULY 1, 1878.



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1878.

DIGEST OF JULY REPORT OF CROPS.

CORN.

Acreage.—There is reported a decrease in the acreage of corn in the central portion of the great corn-growing district of the West, an increase in the South, in New England, excepting Massachusetts, and about the same area in the Middle States as in 1877, a slight reduction being apparent in New York, and a slight increase in New Jersey and Pennsylvania. The increase will very nearly offset the decline in the West, and the breadth of last year, say 50,000,000 acres, is cultivated the present season.

The heaviest decline in percentage and in number of acres is in Illinois, amounting to about two-thirds of a million acres, or a reduction of 7 per cent. In some of the adjoining States the reduction is but 1 or 2 per cent., the heaviest being in Wisconsin, 4 per cent., which is but about 40,000 acres. The increase in Texas, as indicated by the counties reporting, is 10 per cent., or about 200,000 acres. Louisiana, Arkansas, and Mississippi make a large advance, the first-named State about 100,000 acres.

The causes operating are: In New England, a growing belief in the profit of cereal production, encouraged by the agricultural press and the local meetings of State and county organizations; in the South, a desire to be self-supporting, to produce abundant provision crops, a home supply of bread and meat, and make cotton a surplus crop. It is a consummation long desired by advanced Southern agriculturists, and very slow of practical fulfillment. The decrease in the West is the result of the unusual breadth accorded to wheat, and in part to the difficulty of planting promptly, especially in the wet areas of Illinois.

Condition.—The average condition of the whole crop is 95, a figure raised considerably by the very favorable returns received from the South, and better than could have been expected a month ago. The record places the condition of this crop on the 1st of July below the standard of good condition in all the States, except South Carolina, the five Gulf States between the Atlantic and the Rio Grande, and those west of the Missouri River. In all the remaining area the causes of inferior condition were similar, too much rain at planting time, the temperature too low for quick germination, and the checking of subsequent growth by frosty nights and the flooding of the low lands. A large amount of labor was lost by the necessity of replanting wet areas where the seed had decayed. Irregular and defective stands, from frequent occurrence of wet places in uplands, are common. The value of thorough drainage has had a remarkable test, which farmers have more generally appreciated than usual. In tile-drained lands corn is generally in fine condition, with

good stands, and cannot fail to afford a large profit on the investment of draining. It is not merely the flooded lands that have been benefited, but all land subjected to systematic drainage has been in better condition for an early start and vigorous growth of the crop.

There is much inequality in the height and appearance of plants, owing to the different measure of saturation and consequent difference in temperature of soils. This is not only observable in different fields of the same neighborhood, but in the same field. Yellowish, feeble, stunted plants are common in low ground. In warm, aerated soil, vigorous growth and dark-green color are characteristics of the crop.

Throughout this area of cold and wet, during May and the first half of June, corn was small, and at least a week, perhaps ten days, later than usual. The last ten days of June witnessed very rapid improvement, when the season of high temperature opened, which gave to correspondence a tone of cheerfulness heretofore unknown in the corn reports of the season. Our correspondent in Monroe County, Ohio, asserts that during the last four days of June corn grew as much as in all its prior growth.

While the plant is still small, as a rule, its color is generally good, its appearance vigorous, promising rapid growth with continued favorable weather, with a strong probability of still more marked improvement. The number of counties reporting the condition of corn is 1,052, of which 287 return 100, 252 above, and 513 below that standard. Very few in the West give a figure above 100; Illinois has only 5 of the 58 reporting, while Georgia has 45 of the 72 counties making returns. The list is as follows:

State.	100.	Under 100.	Above 100.	State.	100.	Under 100.	Above 100.
Maine	4	2	7	Louisiana	6	8	11
New Hampshire	3	5	0	Texas	6	9	31
Vermont	2	7	0	Arkansas	15	6	13
Massachusetts	4	1	0	Tennessee	11	15	12
Rhode Island	1	1	0	West Virginia	6	24	3
Connecticut	4	0	1	Kentucky	13	15	0
New York	6	24	1	Ohio	11	46	2
New Jersey	2	5	0	Michigan	9	24	1
Pennsylvania	3	33	1	Indiana	11	28	2
Delaware	0	2	0	Illinois	11	42	5
Maryland	0	12	0	Wisconsin	2	26	2
Virginia	14	46	2	Minnesota	8	18	5
North Carolina	17	21	10	Iowa	18	33	5
South Carolina	12	3	8	Missouri	22	18	20
Georgia	18	9	45	Kansas	9	6	14
Florida	7	7	3	Nebraska	13	9	6
Alabama	3	4	16	California	6	1	4
Mississippi	8	8	16	Oregon	2	1	0

The average for the country is 95. The proportion of the entire crop represented in the July returns is about one-half. The following States make a better showing of condition than in July of last year: North Carolina, South Carolina, Alabama, Mississippi, Louisiana, Texas, Arkansas, Kentucky, Ohio, Illinois, Minnesota, Iowa, Missouri, Kansas, Nebraska, and California.

In New York, as late as June 6, as far south as Albany County, corn was injured by frost. The frosts of May injured the crops in the western part of the State.

The crop in New Jersey is reported "backward, but healthy," and rapidly improving under the influence of hot weather.

Wet weather, frosts in May, and cold nights in June, until recently, are frequently-mentioned causes of small growth and poor condition in Pennsylvania. In Sullivan County the present is deemed the poorest prospect ever shown there at this date. "Very bad condition" is reported in Montour. Cambria, Perry, and McKean report 70; Forest, Clearfield, York, and Lawrence, 75; and only four, Northampton, Montgomery, Mercer, and Erie, as high as 100.

Every return from Maryland indicated low condition, ranging from 75 in Queen Anne and Saint Mary's to 97 in Harford and Prince George's. Anne Arundel is returned at 95, and Washington, Howard, Calvert, and Cecil at 90. The same causes operated as in Pennsylvania. Cut-worms were destructive at many points.

There are returns from 62 counties of Virginia, ranging from 60 in Northumberland to 125 in Smyth, in the limestone district of the southwest. Warwick returns 110, and the counties reporting 100 are Sussex, Essex, Fluvanna, Pittsylvania, Russell, Campbell, Roanoke, King and Queen, Middlesex, Montgomery, and Isle of Wight. Loudoun, a fine corn county, represented by 80, has had an excess of rain, but the crop is now rapidly improving. The general backwardness of growth is caused by low temperature and too much rain for proper cultivation. The color is now generally good and the growth rapid.

Fifty counties are represented in North Carolina. The average, 97, indicates more favorable conditions, the range being from 80 in Lincoln, Caldwell, and Iredell, in the mountain region, to 125 in Anson, where the crop is more promising than for years. The best results are in Anson, Warren, Pitt, Macon, Wake, Harnett, Rowan, Randolph, Stokes, and Edgecombe, all reporting above 100. There was some replanting in certain districts, notably in a belt ten miles wide in Wayne that was swept by a tornado. Cut-worms were also destructive in places.

In South Carolina, the complaint of cold, wet weather is almost unknown, and but three reports are below the standard of good condition. Colleton returns 120 and Abbeville 115. It is "the most promising crop since 1865" in Williamsburg; "the finest for many years" in Darlington. In Laurens the crop is well grown, tasseling and silking. In Horry (reporting 98) there is complaint that "the crop is fired by drought and heat following a wet season."

Florida has a larger proportion of low returns. In Columbia corn was injured by drought in May. Manatee makes the average 50, the result of excessive rains. Fine condition is indicated in Jackson, Marion, Madison, Bradford, Hamilton, Santa Rosa, Liberty, Putnam, and Hillsborough.

The returns from Georgia are from 72 counties, of which only nine make low condition. Those making very high returns are Hancock, Schley, Houston, Early, Stewart, Screven, Dooly, Jones, Jefferson, Upson, Heard, and Columbia. The following notes are given:

Dooly: Recent heavy rains caused rank growth. *Taliaferro*: Best prospect since 1860. *Cobb*: Looks fine. *Crawford*: Good, but needs rain. *Gordon*: Healthy and well cultivated,

but small for the season. *Gwinnett*: Promising and early, but injured by hail. *Wayne*: Best prospect for ten years. *Lincoln*: Good stands prevented in some localities by bud-worms. In some cases the worm perforated the stalk when nearly ready to tassel; sometimes it devoured the blade, tassel, and young shoots; it has cast a blight over many fields. *Madison*: Ten days early and in fine condition. *Floyd*: Injured by grasshoppers. *Jefferson*: Remarkably fine growing season. *Richmond*: Great injuries from hail-storms. *Troup*: Very fine. *Terrell*: Crop promises a surplus.

Condition is equally favorable in Alabama, five-sixths of the counties making high returns. "A remarkably fine season, and the best crop for many years," is the report from Covington. In Baldwin the rains have been very heavy, threatening inundations of bottoms. In Calhoun there is present need of rain. Few correspondents seem disposed to cast the slightest shadow upon the crop prospect.

In Mississippi the general average of condition is 101. Among the most favorable returns are those from La Fayette, Wilkinson, Washington, Madison, Marshall, De Soto, Winston, Claiborne, Greene, Marion, Covington, Coahoma, Tippah, Jackson, and Jasper. Rains have done some damage in Washington and Jefferson.

Only the parishes of Madison and La Fayette, in Louisiana, report any depreciation in condition. In Concordia it is called the best and largest since the war.

Five-sixths of the Texas reports are up to the standard of good condition and more than two-thirds are above it. The only reference to drought is in Dallas, where there are "imperfect stands from spring drought followed by excessive rains." Heavy rains have interfered with cultivation in Collin. In Bandera there is expected the "largest crop in eighteen years, that will average 40 bushels to the acre." "The finest crop ever raised," is claimed in Bastrop. In Washington a heavy crop is indicated, and corn is now slow of sale there at 25 to 30 cents per bushel. In Fannin "the acreage greatly increased and the yield beyond everything before known; many fields will average 50 to 60 bushels per acre."

Arkansas lacks a single point of full condition by the low record of a minority of counties, of which the worst showing is made in Izard, Columbia, Lawrence, White, and Craighead.

Coming into Tennessee, we find a slightly reduced average of condition, yet the prospect is very fine in a majority of counties. There is local complaint of poor stands, worms, and wet weather. Montgomery is reported as low as 50, and Houston, Greene, and Fayette, are placed at 80; none others are lower than 90, and six-tenths are 100 or more.

In the higher elevations of West Virginia the uplands have been too cold, and in valley lands or bottoms too wet, for corn, until recently; condition in July represented by 92. The crop is not generally well grown, but is now in good condition to improve.

Few counties in Kentucky report much depreciation in condition, though the causes operating throughout the Ohio Valley have, in places, caused imperfect stands and a smaller growth than is usual on the 1st of July.

The weather has been still less favorable in Ohio. Less than one-fourth of

the counties return full condition. Among these are Clinton, Clermont, Delaware, Fayette, Hancock, Holmes, Meigs, Pike, Ross, Vinton, and Washington. The following notes from correspondents are appended:

Clark: Fears of injury by frost, but looks well. The Compton Early Yield corn is a failure in this region. *Hardin*: Backward on account of cold nights, but growing faster since the temperature has risen. *Montgomery*: Backward, but in the favorable weather is rapidly improving. *Ashtabula*: Backward, but stand good. *Columbiana*: Injured somewhat by floods. *Delaware*: Large acreage and good stand; good condition of growth. *Geauga*: Looks well, though backward. *Hancock*: Small, but doing well. *Morrow*: Retarded by cold; grew in height the last few days as much as it had grown previously. *Adams*: Small, but of good color, and rapidly improving under the heat of a few days past. *Holmes*: Small and backward, but improving fast. *Licking*: Backward, with imperfect stand, but generally clean. *Preble*: Retarded by cold.

The record of Michigan is very similar to that of Ohio; a fair stand, small but healthy plants, growing vigorously at present, and with future favorable weather promising a medium crop.

In Indiana good cultivation is co-operating with fine weather to repair the damage of cold and wet weather in May and early June, and in average condition the status of the crop of the entire State ranks very near that of Ohio and Michigan. Among the counties producing more than a million bushels, Rush reports 80; Shelby, 105; Bartholomew, 100; Johnson, 90; Morgan, 95; Marion, 95.

Illinois has had somewhat greater drawbacks, especially from wet and flat areas. The condition of some counties of heavy production is thus reported: Bureau, 90; Madison, 90; Tazewell, 100; Woodford, 60; Logan, 90; Shelby, 85; Knox, 80; McLean, 90; Sangamon, 65; Vermillion, 85; Warren, 105; Henry, 95; Macon, 90; Mason, 90. Each of these counties run heavily into the millions of bushels, none of them in the crop year of the census less than two millions.

Notes from general remarks are as follows:

Carroll: May and June wet and cold, causing much replanting; crop now doing well. *De Witt*: Acreage reduced by the flooding of low lands; crop stunted. *Ford*: Half a crop. *Fullon*: Seriously affected by the cold rains of May and June. *Grundy*: Badly drowned out; late and weedy. *Lee*: Below last year about 25 per cent. *McLean*: Small, but of good color; drowned out on land not tile-drained; best corn on land well drained. *Ogle*: Backward and unpromising, but rapidly improving. *Jefferson*: Affected by drought, bad stand, and defective seed. *Putnam*: Growing finely, but small for the time of the year. *Henry*: Dry, warm weather will bring out the corn. *Crawford*: Poor stand and weedy. *Jersey*: Injured by excessive rains. *Marshall*: Fine growing weather since June 20, and the crop doing well. *DeKalb*: Backward, but an excellent stand and well cultivated; rapid improvement in ten days. *Hamilton*: Acreage reduced to enlarge that of wheat and oats. *Madison*: Did not generally come up well, particularly the early planted; stands poor and unequal. *Woodford*: Much corn rotted through incessant rains.

The Wisconsin crop has felt the prevalent drawbacks of the season quite as much as Illinois; yet it is of good color and medium vigor, except in low lands, where it is still feeble and yellow. Among counties of large production, Keweenaw stands pre-eminent at 120; Grant, 95; Rock, 75.

In Minnesota condition is far in advance of Wisconsin, and much better than in July of last year; average, 95.

Iowa reports rather more favorably still, at 98. The crop is not quite so well advanced as usual, but is growing very vigorously; the color is dark green, and the stand generally good. Growth has been retarded by light frosts and a wet soil.

Missouri averages the same as Iowa, with similar conditions of growth.

Kansas has a habit of exceeding expectation, and though the State is not fully reported, the average of all returns of condition is 104. Douglas, one of the heavy counties, returns 120, and Johnson 100. The crop is two weeks in advance of that of 1877. There never was a greater promise in Labette. In Woodson the crop in bottom lands has been damaged by wet weather. Other sections of "droughty Kansas" return similar complaints of damage from too much rain.

The promise is still more favorable in Nebraska for an increased crop.

In California the season has been exceptionally favorable for corn, and there is scarcely a report of low condition from the golden coast.

At the present writing there is no reason to prognosticate a small corn crop for 1878. The outcome will depend upon the weather.

WINTER WHEAT.

The wheat harvest was in progress, at the date of returns, in the more northern belt of the winter-wheat zone, it having been completed in all the Southern States. The usual period of this harvest extends over two months, or from the middle of May to the middle of July. In some districts in Texas wheat has sometimes been cut in April. This year it has been a week or ten days earlier than usual, and only in very high latitudes has cutting been delayed beyond the 4th of July.

There has been an abundance of harvest labor, and work has progressed rapidly, obstructed only by storms that have prevailed in many sections. The more industrious of the class known as "tramps" have been profitably employed, while the communistic and vicious element has in some instances spent its energies in the destruction of agricultural machinery, especially self-binding reapers.

In nearly all the counties of New York high condition is reported. There is a large growth in Genesee, with some loss from rust; condition, 95. There was serious injury by the Hessian fly in Wayne, which reports 75, as do Orange and Seneca. Oswego returns 80, and Saratoga 97. The highest reports of condition are from Madison, Niagara, Allegheny, and Wyoming.

Serious injury by insects in Warren and other counties in New Jersey reduces the crop one fourth.

An unusually fine harvest has been gathered in Pennsylvania. Lebanon, Mifflin, Sullivan, and other counties claim the best crop ever grown. In Beaver, Armstrong, and other counties the fly has reduced the yield materially. In Elk a poor crop is reported, being winter-killed so that some fields have been cut for fodder.

The finest crop, in quantity and quality, ever produced in New Castle, Delaware, has been harvested.

With some depreciation from May frosts in Maryland, the average returns will be large.

In the Southern Atlantic States the season has been unfavorable and low returns are made: Virginia, 94; North Carolina, 78; South Carolina, 68; Georgia, 75. The following notes from correspondence indicate the causes:

VIRGINIA.—*Caroline*: Greatly injured by rust. *Sussex*: Ruined by hail-storm of June 10. *Southampton*: Injured by rust. *Brunswick*: Cut down to half a crop by rust. *Charles City*: Injured by rust, rain, and hail. *Orange*: Sad decline since May; the milk weevil, a rare insect, together with some strange grain malady, have made stems brittle, rendering it difficult to harvest the grain; heads imperfectly filled and of poor quality. *Loudoun*: Increased acreage, but the yield has fallen off. *Henry*: All varieties light except the Lancaster; increased acreage makes up for diminished yield. *Highland*: Blade rust, but not very injurious. *Page*: Had to be cut wet; consequently in bad condition. *Prince William*: Heavy straw, but poor and scant yield; heads imperfectly filled and grain shrunken. *Roanoke*: Poor yield. *Augusta*: Harvest ten days earlier than formerly; Fultz ripens early; crops are fine generally. *Chesterfield*: Poor yield and quality. *Gloucester*: Thrashing out but 60 per cent. of the estimated yield. *James City*: Injured by hail and rust. *King and Queen*: Cut down half by rust. *Matthews*: Half a crop; rust. *Middlesex*: Seriously damaged by wet. *Montgomery*: Short and poor. *Pulaski*: Badly rusted; half an average yield. *Tazewell*: Rust. *Westmoreland*: A failure; rust and fly. *Elizabeth City*: Badly injured by hail. *Warwick*: Cut down half by rust.

NORTH CAROLINA.—*Warren*: Injured by rust. *Yadkin*: Injured by rust and smut. *Wilkes*: Injured by rust. *Lincoln*: Yield declining, especially of white wheat; Fultz yielding 20 per cent. better than any ever received from the department. *Gaston*: Damaged by rust and other causes. *Iredell*: A failure through rust. *Mecklenburg*: Poor. *Wayne*: Many fields destroyed by a hurricane. *Forsyth*: Good. *Beaufort*: Damaged by rust, but the great increase in acreage makes the crop as great as in any previous year. *Hertford*: About a third of a crop of shrunken grain. *Mitchell*: Half a crop. *Perquimans*: Half crop; rust. *Alamance*: A third short. *Anson*: Badly rusted. *Pitt*: Half a crop and poor; grain shrunken by rust. *Transylvania*: Rusted, but better than was expected; Mediterranean less damaged than other varieties. *Bladen*: Badly rusted; crop poor and late. *Haywood*: Imperfectly headed.

SOUTH CAROLINA.—*Clarendon*: Considerable increase of acreage and a heavy crop. *Newberry*: Our few fields of winter wheat ruined by rust; spring wheat affected in the same way to some extent, and will not bring over half a crop. *Colleton*: A full crop. *Darlington*: Wheat not so good as last year. *Laurens*: Half crop; rust and fly. *Orangeburg*: Suffered from rust. *Union*: Rusted.

GEORGIA.—*Madison*: All harvested; two-thirds average. *Gordon*: Yield about 5 bushels per acre of inferior grain. *Union*: Sheaves large, but it will not thrash out in proportion. *Forsyth*: Increased acreage will counterbalance declining yield and bring the crop up to last year's. *Jefferson*: May too wet. *Troup*: Rusted. *Carroll*: A little below average. *Hart*: Half crop.

In Alabama and Mississippi very little is grown, and the yield of the present crop has been low. No wheat is sown in Louisiana, unless here and there an experimental plot. Texas has harvested a full crop, on a very large acreage, in fine condition.

In Arkansas and Tennessee the yield has been greatly reduced by insects and blight. The average for the former State is 54. Kentucky reports similar injuries, operating in a less degree.

In the Ohio Valley the crop is almost unexampled in luxuriance, the averages of condition being: Ohio, 125; Michigan, 105; Indiana, 115; Illinois, 107.

The following extracts from the crop notes show the local conditions in this region:

KENTUCKY.—*Cumberland*: Shortened by rust. *Gallatin*: Damaged by rust, but still above average. *Shelby*: Backward on account of the season, and injured by rust, scab, smut, and the midge; heads poorly filled. *Warren*: Injured in early spring by the Hessian fly and by rust. *Daviess*: Runs from 5 to 25 bushels per acre, averaging 12; acreage from 25 to 33 per cent. greater than last year and double the average acreage of ten years previous. *Lincoln*: Large yield of straw, but the grain not so plump as last year; much wheat thrown down by storms and will be but partially saved. *Clinton*: Most of the crops injured by rust and flies. *Crittenden*: An unusual breadth sown last fall, but only half of last year's acreage cut; the rest ruined by rust and other causes. *Graves*: Nearly a failure through rust. *Nicholas*: Quality excellent; quantity greater than last year. *Scott*: Acreage increased 25 per cent. and average yield 5 to 10 per cent. *Calloway*: Almost a failure. *Owsley*: Rust, about May 10, very injurious. *Rowan*: Destroyed by rust.

OHIO.—*Clark*: Crop got a late start in the fall, but the favorable spring brought it forward very fast; prospect of a large crop; Clawson wheat has done well. *Hardin*: Good. *Miami*: Best crop ever known here. *Montgomery*: Favored by the cool weather. *Williams*: Looking very fine. *Ashland*: Bright prospect. *Ashtabula*: Magnificent crop. *Athens*: The rust injured the crop but slightly. *Columbiana*: Fly injurious. *Coshocton*: Splendid crop; Fultz received from the department in 1875 gives the best crops ever raised in this county. *Delaware*: Prospect of a large yield; 30 per cent. more than any previous crop. *Geauga*: The cold May and June saved the crop; growth of straw would have been still larger but for the cold. *Hancock*: Heaviest crop ever known here; some fields average 45 bushels per acre. *Monroe*: Crop splendid in spite of rust and fly. *Adams*: Ripening finely; grain plump and fair. *Holmes*: Never better. *Lawrence*: Extra yield and well filled grain. *Licking*: Heavy straws and large acreage, but injured by the fly and blade rust. *Sandusky*: Prospect of a large crop. *Tuscarawas*: Prospect for enormous crop. *Lorain*: Heavy and fine. *Clermont*: Best crop for years.

MICHIGAN.—*Tuscola*: Affected by the fly; the Clawson rusting. *Oakland*: Looks well, though cut by insects on light soils. *Muskegon*: Full average. *Delta*: Favorable conditions of growth. *Clinton*: Promises to fill well. *Mason*: Looks well. *Lenawee*: Some complaint of insects in early-sown winter wheat; rusted, but not seriously injured. *Calhoun*: Harvest a week later than usual. *Clinton*: Shocked in first rate condition. *Wayne*: Promises a prodigious yield. *Branch*: Looks well. *Charlevoix*: Spring wheat never better. *Montcalm*: Injured by frost.

INDIANA.—*Ripley*: Gathered in good condition; yield and quality excellent. *White*: Good crop and fine harvest weather. *Shelby*: The largest crop on record, and secured in good condition. *Howard*: The largest crop ever harvested in this county; quality very superior. *Dubois*: Very good. *De Kalb*: Winter wheat injured by the fly; stands thin on the ground, but well headed. *Franklin*: Coming on finely; head filling well; crop good in spite of blade-rust, which, however, ruined some bottom crops. *Washington*: Somewhat injured by wheat and fly, but the grains full and plump; well secured; acreage about 40 per cent. more than last year. *Warrick*: Great diversity of opinion as to the crop yield. *Wabash*: Has filled well; largest crop yet raised here; Fultz and Clawson the most prolific varieties; silver hull from the department promises well, but is ten days later than the Fultz. *Morgan*: Never better; secured in splendid condition. *Lawrence*: Well secured. *Decatur*: Recovered from rust and made a full yield of plump, heavy grain, 61 or 62 pounds per bushel. *Miami*: Heaviest crop since 1864. *Tipton*: Best crop since 1864. *Steuben*: Unusually fine. *Wells*: Greatly improved.

ILLINOIS.—*Carroll*: Since the Odessa has been found good for fall sowing, it has been extensively used for seed. *Fayette*: Largest crop yet made here; aggregate yield double that of last year. *Fulton*: Winter wheat of good quality. *Jasper*: A fine crop, but likely to be injured in the shock by the extensive rains. *Jefferson*: Unprecedented; weighs 63 to 65 pounds per bushel, and sells at 75 cents and 80 cents; secured in fine condition. *Lee*: Late, some winter wheat ruined by rust; some early fields badly damaged. *Macoupin*: Winter

wheat above average in quantity and quality. *Ogle*: Our small area looks well, especially silver chaff. *Putnam*: Promising. *Williamson*: Acreage and yield each 20 per cent. above last year; price 75 to 80 cents per bushel. *Crawford*: Well secured and of fine quality. *Jersey*: Greatly improved and nearly average; Fultz the best quality. *Marshall*: Prospect here better. *Hamilton*: Secured in good condition and of excellent quality; Fultz and Red Sea the best; Jennings too small and late. *Madison*: Rust not very injurious.

WISCONSIN.—*Crawford*: Largest crop of winter wheat for twenty years; spring wheat somewhat rusted. *Fond du Lac*: Spring wheat the heaviest growth in eighteen years. *Pierce*: Much grain lodging. *Richland*: Winter wheat falling badly through heaviness; sells at 80 cents per bushel. *Walworth*: Looks well. *Juneau*: Spring wheat badly rusted; not over a half crop; winter wheat very fine. *Adams*: Beginning to rust; chinchies on hand.

The general average of condition of winter wheat for its entire breadth is 101. With the large increase of acreage it assumes a larger aggregate than last year, generally of a superior quality.

SPRING WHEAT.

The extraordinary promise of last month is continued in the spring-wheat region of the Northwest, and, including California and the spring wheat of the East, the unprecedented average of 106 is made for the entire area of spring-sown wheat. The following notes are appended:

MINNESOTA.—*Faribault*: A superior crop reduced to average by rust and storms. *Fillmore*: Heavy rains have made grain fall badly of late. *Goodhue*: Spring wheat very promising, cool weather very favorable to its growth. *McLeod*: Best growth on record, but tends to too heavy straw. *Meeker*: Spring grain far above average. *Nicollet*: Rain and high winds have developed a tendency to fall. *Redwood*: Wheat unprecedented; heads $5\frac{1}{2}$ inches on straw 4 feet are on exhibition, and in one case 22 stalks from one grain is noted as a specimen of a whole field. *Rock*: Looks well; some rust on leaves. *Sherburne*: Spring wheat remarkably good. *Steele*: Never better, but some pieces are lodging considerably.

IOWA.—*Humboldt*: Some complaint of rust. *Muscatine*: Spring wheat shows excessive growth of straw; many fields rusted. *Allamakee*: Chinchies in the wheat and have done much damage; some rust also. *Buena Vista*: Rusty; some extra crops, but some are very poor. *Emmett*: Spring wheat shows a heavy growth of straw. *Fayette*: Heavy growth, but yellow through rust. *Franklin*: Large growth of straw, but rusting badly. *Hardin*: Some rust in late-sown spring wheat, but it looks heavy. *Howard*: Doing well. *Lee*: Yield unusually good for winter wheat, the grain being plumper than usual. *Lyon*: Low condition of wheat, caused by rust. *Marion*: Rust has greatly cut down a superb condition of the crop. *O'Brien*: Growth of straw very heavy; many fields have fallen already. *Shelby*: Spring wheat generally rusted.

NEBRASKA.—*Gage*: Some rust, but it has disappeared with better weather; best prospect for many years. *Hall*: Some rust in spring wheat. *Odesa* wheat last year was but slightly rusted, but this year is more affected than any other variety. *Hamilton*: Wheat in a critical condition about the middle of June, when the rain ceased and relieved the crop of its injurious influences; the prospect is now very good, though some varieties have been seriously injured, such as the Sea Island, White, &c. *Johnson*: Spring wheat injured by rust; the crop has had rain enough to carry it through. *Merrick*: Red rust on leaves, but the stems are unaffected and the heads are well filled and heavy. *Richardson*: Rust has somewhat injured spring wheat, but it has largely recovered. *Wayne*: Rust injurious, but fair weather will soon repair damages.

RYE.

The rye crop is equal in vigor of growth and soundness of grain to that of wheat, the general average being 101. The Eastern, Middle, and Western States make high returns. In the South, where its main use is for grazing, comparatively low returns are made, except in Alabama and Texas.

BARLEY.

Barley, like other cereals, promises more than an average yield; the average condition for the whole country being 101.

OATS.

The only States failing to come up to the standard of high condition are: New Hampshire, 99; Vermont, 98; Massachusetts, 95; North Carolina, 91; South Carolina, 99; Georgia, 99; Florida, 92; Michigan, 97; Texas, 92; California, 79; Oregon, 80. All others are 100 or above, ranging to 112, in Tennessee and Nebraska. The general average is 101.

COTTON.

The July returns to the Department of Agriculture indicate that the high condition of cotton reported in June—99 per cent.—has been maintained. The figures indicating condition compared with June figures, are as follows: North Carolina 81, a loss of 6; South Carolina 104, a gain of 5; Georgia 105, a gain of 4; Florida 100, a gain of 2; Alabama 102, a gain of 1; Mississippi 98, unchanged; Louisiana 95, a loss of 3; Texas 106, a gain of 2; Arkansas 91, a loss of 7; Tennessee 98, a gain of 1. Reports of the crop have been received from 304 counties of the cotton belt, of which 68 report 100—118 above and 118 below.

Complaints of excessive rains and depressed temperatures, especially of cool nights, came from different sections of the cotton belt, but during the closing days of June there was a genial improvement in the general conditions of growth. The depressing influences lingered longest in North Carolina, where local disasters from hail-storms and heavy winds are more frequently noted in the reports of our correspondents, but further down the coast there was decided improvement in the prospects of the crop; South Carolina, Georgia, and Florida, reported higher condition than in June. The Gulf coast to the westward also shows improvement in all the States except Louisiana, where injuries to lowland crops overbalance improvement of upland. Fields which wet weather had kept from being worked became very grassy, and the efforts made to remove the grass in many cases injured the plants. In several coast counties abandonment of acreage is reported, amounting in Grayson, Texas, to one-eighth, and in Hunt to 30 per cent. A correspondent in Alabama notes the fact that crops on original prairie land are very fair, while those on cleared land are very inferior.

In Texas, in spite of all drawbacks, there is substantial improvement and a slight amelioration in Tennessee, while Arkansas shows a marked decline.

The rapid growth and early development of the crop in its preliminary stages is a matter of very general remark. In nearly all parts of the cotton belt it is in advance of last year, and of the average of previous years. In some cases the bloom is three weeks earlier than last year.

Insect injuries scarcely deserve mention. In Pamlico, North Carolina, unnamed insects, probably the cutworms reported in June, were troublesome.

Floyd, Georgia, complains of grasshoppers. In Matagorda, Texas, the caterpillar had put in a *bona fide* appearance, and was "rumored" in one or two other counties.

Labor is spoken of in several counties as more accessible and reliable.

FRUIT CROPS.

The condition of the crops has not greatly changed since the June report, the different States showing, on the whole, about the same proportion of a full crop. The growing conditions of June were, on the whole, favorable to such fruits as had escaped the spring frosts. A marked exception is seen in the case of the region around Chesapeake Bay, where conditions of growth in June were decidedly unfavorable. A few local disasters, from hail-storms, &c., are noticed in the other parts of the country, but these affected the general condition to but a small extent.

Apples.—New England still shows a crop above average, as also do Florida, Texas, Nebraska, and California. The maximum condition, 140, is reported in Vermont; Massachusetts and Florida, each, 119. The lowest condition, 55, is in Delaware, and the next lowest, 61, in Missouri. Insect depredations are seldom mentioned; fruit caterpillars (*Clisio campa*) were injurious in Dyer, Tennessee. The blight caused almost a total failure in Clarendon, South Carolina, and in Fayette, Kentucky, injuries are reported from the "twig blight." In different sections there are local tendencies to falling in the fruit, and in some cases it rots on the trees. The early ripening of several varieties attracts notice. In Sevier, Tennessee, the red Astrachan was ripe June 5.

Peaches.—The great peach region around Chesapeake Bay shows a marked decline from even the low figures of June. One correspondent in New Castle, Delaware, has noted one of the prominent causes of this decline in what he calls the "June fall," or the falling of peaches from the trees in that month. He says that this tendency was disastrous to the crops of the whole peninsula. In his neighborhood many farmers who expected to market 10,000 baskets were glad to find 500 baskets on the trees. Delaware reports only one-sixth of a full crop, Maryland 41 per cent., and Virginia 63. The coast peach region farther north also shows a considerable decline. The South and Southwest, taken together, present nearly an average crop. At several points in the Gulf States the market was overstocked with local production as newly-planted areas came into bearing. The southern portions of the region north of the Ohio River show a high average, but the lake slope is not so promising. The crop shows a high condition west of the Mississippi River, especially in Iowa. On the Pacific slope, California is above average, while Oregon returns but three-quarters of an average.

Grapes.—The grape crop is full average or above only in North and South Carolina, Alabama, Texas, Tennessee, Kansas, Nebraska, and California. The frosts of May were destructive in the more northern States, except where low temperatures delayed their fruitage till after frost. In the South there are frequent complaints of the failure of the Scuppernong, the sheet-anchor of South-

ern grape culture. In Ashtabula, Ohio, several vineyards were devastated by rose bugs (*Macroductylus subspinosus*), but with this exception no notices of insect ravages are taken by our correspondents. At several points, both North and South, grapes show a tendency to rot and fall from the vines. In Newton, Missouri, the mildew is reported.

HAY AND PASTURES.

The weather of June was well calculated to preserve and even increase the high condition of the grass crops. Of the States reporting clover the condition is above average in all except Maine, Vermont, and New York. All the States reporting timothy are full average or above, except New Hampshire and Vermont. All the States report pasture, and all are over average except South Carolina, in which spring droughts cut down the condition to 93. In New England the best crops of grass were obtained upon fresh fields or on newly stocked and top-dressed land; old meadows were liable to winter killing. The ox-eye daisy has become very troublesome in this section also. In some northern counties of the Middle States the frosts of spring were more or less destructive to the grasses, but the condition of all these crops in this section is considerably above average. Clover culture is extending in many parts of the South for fertilization as well as feeding purposes. In several counties of Texas alfalfa and California clover have demonstrated their value and adaptation to that region. Millet is also well spoken of in several counties of the South, which seems to be developing its capabilities for grass farming in its own specific direction. In the West and Northwest the same general conditions of prosperity have attended grass crops during the present season. A very thrifty growth of timothy is noted in Minnesota, the grass in many fields being 5 feet high. In some cases clover has been spoiled by excessive rain, but the indications are that the hay crop of the country for 1878 will be very heavy, and that pastures are remarkably abundant.

TOBACCO.

Over nineteen-twentieths of the tobacco crop are raised in twelve States, in which the acreage of 1878 compares with that of 1877 in the following proportion, viz: Kentucky, 71 per cent.; Virginia, 76; Missouri, 72; Tennessee, 78; Ohio, 90; Maryland, 85; Indiana, 77; North Carolina, 89; Pennsylvania, 90; Connecticut, 98; Illinois, 72; Massachusetts, 100. Of the smaller producing States, New York shows a decline of 19 per cent.; West Virginia, 9 per cent.; Arkansas, 8 per cent.; and Wisconsin, 7 per cent. The only States showing increase are: Texas, 125; and Nebraska, 102. But these States grow so little tobacco that their increment goes but little way toward neutralizing the heavy losses in all the other States. The aggregate acreage of 1878 is about one-fourth less than that of 1877.

The condition of the crop in the twelve larger States is as follows: Kentucky, 93; Virginia, 93; Missouri, 101; Tennessee, 89; Ohio, 105; Maryland, 102; Indiana, 92; North Carolina, 94; Pennsylvania, 100; Connecticut, 100; Illinois, 93; Massachusetts, 101.

In the Atlantic States unseasonable planting-times are complained of in some counties, and the crop was considerably backward. In the West the leading complaint is scarcity of plants. The conditions of growth have been generally unfavorable to a high development of the crop, but in some localities there is a marked exception. Our correspondent in Daviess, Kentucky, expects a crop of 14,000,000 pounds in that county. At several points in the extreme South the culture has been successfully inaugurated. Bastrop, Texas, for instance, reports a fine crop.

The reduction of acreage is due to the low prices obtained for the last crop.

SUGAR CANE.

The great mass of this culture is in Louisiana, yet it is extending into several counties of the Gulf States. The area shows a considerable increase over last year. From Georgia our reports show that this crop needs rain, while from Florida we have the statement that it is quite thrifty. In John Baptist Parish, Louisiana, the growth is in advance of last year, the ground having been heavily manured with cotton seed. In Dallas, Texas, this crop has been found to do very well with good cultivation. The general condition of the crop is considerably above average.

WOOL.

The wool clip of 1878 is about 3 per cent. greater than its immediate predecessor. New England fell off about 5 per cent., the three North Middle States 3 per cent., the Pacific States 9 per cent. All the other sections show an increase, viz: The four South Middle States (Delaware, Maryland, Virginia, and West Virginia), $1\frac{1}{2}$ per cent.; the four South Atlantic cotton States (North Carolina to Florida), $2\frac{1}{2}$ per cent.; the six west cotton States (Alabama to Tennessee), 14 per cent.; the North Central States (Kentucky to Wisconsin), $13\frac{1}{4}$ per cent.; States west of the Mississippi, 4 per cent. The heavy decline on the Pacific coast is due to the reduced production in California, and the great increase in the Southwest was in Texas. Among the miscellaneous remarks in the reports is the statement by our correspondent in Liberty, Florida, that the clip of that county indicates an increased weight per fleece and an improved character of fiber. In Walworth, Wisconsin, the fleece is mostly long staple and strong fiber. A considerable weakening of prices is indicated.

SORGHUM.

The large increase in acreage in a few States is more than neutralized by the decline in the others. Minnesota enlarged her breadth 30 per cent.; South Carolina, 12 per cent.; Nebraska, 5 per cent.; Pennsylvania, Texas, and West Virginia each 1 per cent. Connecticut and Kentucky hold their own, while all the other States reporting this crop show a greater or less falling off. The condition of the crop is below average.

Table showing the condition, &c., of crops on the first day of July, 1878.

STATES.	CORN.		WHEAT.		RYE.		OATS.	BARLEY.	POTATOES (<i>Solanum tuberosum</i>).		POTATOES (<i>Batatas edulis</i>) SWEET.		BEANS.	
	Average compared with last year.	Average condition July 1.	Average condition of winter wheat July 1.	Average condition of spring wheat July 1.	Average condition of winter rye July 1.	Average condition of spring rye July 1.	Average condition July 1.	Average condition July 1.	Average compared with last year.	Average condition July 1.	Average compared with last year.	Average condition July 1.	Average compared with last year.	Average condition July 1.
Maine.....	116	100	86	108	102	100	101	99	74	98	99	100	100	100
New Hampshire.....	101	93	86	108	97	100	99	100	92	96	96	100	98	97
Vermont.....	101	88	104	104	104	100	98	110	85	91	95	94	95	94
Massachusetts.....	97	84	90	110	107	100	104	105	95	107	101	94	94	97
Rhode Island.....	110	98	106	101	105	100	108	106	106	100	100	100	100	83
Connecticut.....	105	98	106	101	103	100	105	101	95	100	101	100	100	100
New York.....	98	90	109	94	103	100	105	101	101	100	101	100	96	95
New Jersey.....	101	92	109	105	101	104	107	116	103	94	99	100	100	100
Pennsylvania.....	101	88	104	106	105	104	107	116	103	101	99	100	93	99
Delaware.....	100	80	103	106	105	104	116	100	103	100	102	100	100	102
Maryland.....	100	87	106	106	105	104	116	100	102	98	99	100	99	95
Virginia.....	105	88	94	106	97	106	103	101	102	101	99	100	99	95
North Carolina.....	102	97	108	95	97	106	103	97	101	104	101	103	101	102
South Carolina.....	106	105	68	93	93	101	99	93	100	101	99	106	101	102
Georgia.....	104	108	75	93	93	103	92	93	100	103	103	103	103	97
Florida.....	100	94	65	101	108	105	92	103	106	103	103	103	101	100
Alabama.....	104	107	81	108	86	100	100	103	106	105	103	105	101	103
Mississippi.....	108	101	81	108	86	100	100	103	106	105	103	105	99	100
Louisiana.....	113	103	100	104	104	113	92	102	120	106	100	100	99	100
Texas.....	110	108	100	104	104	113	92	102	120	106	100	100	110	114
Arkansas.....	104	99	54	86	86	104	92	102	105	103	102	103	103	103
Tennessee.....	96	96	91	91	91	101	112	101	96	105	99	97	100	103
West Virginia.....	99	92	108	104	104	104	108	102	99	103	103	95	99	96
Kentucky.....	103	97	85	91	98	101	111	108	103	106	100	100	100	100
Ohio.....	100	93	112	101	104	98	104	100	99	99	96	99	99	98
Michigan.....	98	91	105	101	102	100	97	97	98	101	96	99	98	98
Indiana.....	98	90	115	101	103	103	105	104	92	97	96	93	97	98
Illinois.....	93	87	98	99	99	103	105	104	101	101	97	97	99	102
Wisconsin.....	96	85	109	103	106	108	105	102	100	96	100	100	100	105
Minnesota.....	98	95	112	106	112	108	103	102	103	101	100	93	97	94
Iowa.....	99	93	99	105	101	101	99	99	106	104	100	100	100	97
Missouri.....	100	94	103	105	105	101	104	100	104	104	99	96	102	100
Kansas.....	106	104	110	90	93	110	105	100	130	111	108	101	103	101
Nebraska.....	114	106	113	105	108	110	112	105	126	119	97	102	101	104
California.....	123	115	91	98	104	97	79	103	130	170	126	128	128	108
Oregon.....	100	100	97	90	104	100	80	80	103	94	100	100	102	87

Table showing the condition, &c., of crops on the first day of July, 1878—Continued.

STATES.	Sorghum.		SUGAR-CANE (not sorghum).		TOBACCO.		CLOVER.	TIMOTHY.	PASTURE.	COTTON.	WOOL.	APPLES.	PEACHES.	GRAPES.
	Average condition with last year.	Average condition July 1.	Average compared with last year.	Average condition July 1.	Average compared with last year.	Average condition July 1.	Average condition July 1.	Average condition July 1.	Average condition July 1.	Amount of wool (in hundredths) com- pared with last year.	Average condition July 1.	Average condition July 1.	Average condition July 1.	Average condition July 1.
Maine.....							96	101	137		101	101	85	98
New Hampshire.....														
Vermont.....														
Massachusetts.....														
Rhode Island.....														
Connecticut.....														
New York.....	100		18	108	101		101	100	111		101	101		94
New Jersey.....														
Pennsylvania.....														
Delaware.....	101	76	6	101	101		101	100	107		101	101		93
Maryland.....														
Virginia.....														
North Carolina.....	99	97	58	103	101		101	113	111		101	101		97
South Carolina.....	112	101												
Georgia.....														
Florida.....	98	98	97	100	101									
Alabama.....	96	96	100	100	100									
Mississippi.....	96	96	100	100	100									
Louisiana.....	101	100	102	100	100									
Texas.....	101	100	114	100	100									
Arkansas.....	95	96	96	100	100									
Tennessee.....	91	96	96	100	100									
West Virginia.....	101	96	96	100	100									
Kentucky.....	100	96	100	100	100									
Ohio.....	96	96	101	100	100									
Michigan.....	96	96	101	100	100									
Indiana.....	96	96	101	100	100									
Illinois.....	95	96	101	100	100									
Wisconsin.....	94	93	101	100	100									
Minnesota.....	130	96	93	100	100									
Iowa.....	96	96	100	100	100									
Missouri.....	96	96	100	100	100									
Kansas.....	97	101	101	100	100									
Nebraska.....	105	101	101	100	100									
California.....														
Oregon.....														

DEPARTMENT OF AGRICULTURE.
SPECIAL REPORT—No. 7.

REPORT

UPON THE

CONDITION OF CROPS

AUGUST 1, 1878.



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1878.

AUGUST REPORT OF GROWING CROPS.

COTTON.

As was expected, our August returns show a decline from the very high figures of June and July. The average condition of the whole cotton belt is 95, a fall of 4 per cent. The State averages are as follows: North Carolina 82, a gain of 1; South Carolina 97, a loss of 7; Georgia 92, a loss of 13; Florida 99, a loss of 1; Alabama 98, a loss of 4; Mississippi 92, a loss of 6; Louisiana 90, a loss of 5; Texas 108, a gain of 2; Arkansas 98, a gain of 7; Tennessee 92, a loss of 6. The average condition of the crop at the beginning of each of the summer months of the past two years was as follows:

States.	1877.			1878.		
	June.	July.	August.	June.	July.	August.
North Carolina.....	80	88	88	87	81	82
South Carolina.....	91	87	88	90	104	97
Georgia.....	101	90	85	101	105	92
Florida.....	92	95	93	98	100	99
Alabama.....	90	94	94	100	102	98
Mississippi.....	91	93	90	93	98	92
Louisiana.....	98	102	106	98	95	90
Texas.....	91	94	96	104	106	108
Arkansas.....	94	94	93	98	91	98
Tennessee.....	94	96	90	97	98	92
General average.....	93	93	93	99	99	95

Of 299 counties reporting the condition of the crop, 63 report 100, 83 above, and 153 below, as shown in the following table:

States.	Number of counties reporting 100.	Number of counties reporting more than 100.	Number of counties reporting less than 100.	Total in each State.
North Carolina.....	3	4	28	35
South Carolina.....	5	4	9	18
Georgia.....	9	15	46	70
Florida.....	9	3	6	18
Alabama.....	8	12	8	28
Mississippi.....	7	3	17	27
Louisiana.....	3	3	6	12
Texas.....	13	2	9	24
Arkansas.....	9	2	15	26
Tennessee.....	4	3	9	16
Total in the ten States.....	63	83	153	299

The condition of the crop is somewhat better than in August, 1877. The acreage has also been somewhat increased, and both elements of the problem indicate an increased product, provided the conditions of growth continue as they are and the harvest be as favorable as last year.

In the northern portion of the cotton region during July, many counties report injuries from severe drought and intense heat. A correspondent in Georgia states that for ten days together the thermometer ranged from 85° at 7 a. m. to 100° at 2 p. m. and 104° at 4 p. m. This has resulted in an extensive shedding of squares and in the premature opening of the bolls. Further south the injuries are attributed to excessive rains, preventing the proper working of the crop and resulting in rust. In some cases rust is found most common in fields highly fertilized, while in other cases lands subsoiled and thoroughly tilled and fertilized have the fairest prospect of good crops.

At the date of the returns insect injuries were not very extensive, but in different portions of the cotton region cotton worms, in the *imago* or perfect state, had appeared. Reports of later date to Prof. Riley, the entomologist, show some injuries from this source. Extracts from his correspondence will be found elsewhere in this report.

The following notes from our regular statistical returns illustrate local aspects of the crop :

NORTH CAROLINA.—*Wayne*: Extreme scorching hot weather for a period of 24 days has been injurious. *Bertie*: Cotton injured by excessive drought. *Davie*: Very dry. *Duplin*: Severe drought, and cotton has suffered worse than corn, being checked in its most vigorous season of growth. *Martin*: Cotton has suffered from the cold and backward spring; it cannot recover, owing to our short season. *Nash*: Dry weather kept the weed small, but caused it to commence fruiting well. *Pasquotank*: Most severe drought; no possibility of making much over half a crop of cotton. *Warren*: Injured by drought. *Chatham*: Backward and low, but covered with an unusual number of bolls. *Columbus*: Never better, but has suffered some from drought. *Granville*: Suffered from drought. *Wake*: Damaged more by drought than at any other time for twelve years. *Rowan*: A couple of weeks later than usual. *Beaufort*: Improved, but stand still defective and a few days later than usual; condition otherwise good. *Gates*: Improved, though the stand is still bad. *Pamlico*: Favorable weather in July has improved the crop. *Camden*: Stand poor and small, owing to drought. *Bladen*: Will not make more than half a crop from present prospects. *Edgecombe*: Stand slightly worse than last report, but the fruiting is remarkably good. *Greene*: Cotton-weed smaller than was ever known at this time. *Wilson*: General appearance is promising, but plant small for the season.

SOUTH CAROLINA.—*Union*: Crop continues fine in growth and fruiting; is unusually clear of grass. *Williamsburg*: Intense heat and drought have caused shedding and loss of vitality in the plant. Season at present good, and may still make a splendid crop. *Darlington*: So far an unusually fine season. *Fairfield*: The plant has come on well; fully two weeks earlier than for several years. *Horry*: Cotton has not suffered materially; fine rains have set in. *Laurens*: Drought has injured the crop; cotton shedding its fruit and its growth is stopped. *Lexington*: Cotton improving, except where the drought prevails, which does not extend over a great area of the county. *Edgefield*: Drought has reduced prospects twenty-five per cent. *Marion*: Cotton two weeks earlier than usual. *Newberry*: Has improved and promises well. *Chester*: Small, but the weed well fruited for the size. *Clarendon*: Gives good promise. *Georgetown*: Suffered from drought and shedding badly.

GEORGIA.—*Cobb*: To July 10 was the most promising crop for many years; at that date dry weather and the hottest weather known for years set in. It remained so until the 28th, injuring cotton to a considerable extent. *Gwinnett*: Hot weather and three weeks'

drought have injured cotton. *Habersham*: Dry weather has reduced the average. *Hart*: Dry weather will perhaps cause shedding of forms to an injurious extent. *Houston*: Hot for two weeks, causing reduced average. *Richmond*: Has shed much on gray lands and lands not deeply plowed. *Troup*: Six weeks' drought and hot weather caused much shedding of squares and small bolls as well as premature opening. Rains have set in, and should the weather continue favorable will make an August crop, as the weed is large and very generally fertilized. *Elbert*: Damaged by drought. *Jackson*: Damaged at least one-third by drought. *McDuffie*: Thermometer ranged from 85° at 7 o'clock a. m. to 100° and 104° at 2 and 4 p. m., for ten days, causing the cotton to shed its leaves and throw off over one-third of its fruit. *Marion*: Materially injured by a four weeks' drought. *Thomas*: Never better, but we fear the continued rains. *Madison*: Portions of the county without rain for six weeks. *Murray*: A long drought has made the prospect gloomy. *Ferrell*: Some rust; no caterpillar as yet, but the appearance of the fly has caused some fears. *Upson*: Cotton never better up to last report; since then it has been badly injured by drought. *Carroll*: Almost a failure in this county; rust and shedding have done the work. *Hancock*: Severe drought has caused the cotton to shed off three-fourths of its fruit, and if we do not get rain soon it will not make over one-third of a crop. *Henry*: Injured by drought. *Macon*: Sunshine so intense as to scorch cotton and cause all young buds to dry up and fall off. *Whitfield*: Injured by severe drought. *Baldwin*: Excessive heat and drought, causing premature opening and shedding of fruit. *Chattooga*: Some rust. *Calhoun*: Injured by rust. *Columbia*: Twelve days ago we had prospects of a splendid crop; now it is literally "burned up;" forms and squares, up to the very top, are dead and falling off. *De Kalb*: General opinion is that cotton is injured one-fourth by drought and heat. *Floyd*: Hot as the sirocco, and cotton shedding its fruit. *Forsyth*: Cotton injured by drought; cannot tell to what extent. *Jasper*: Five weeks' drought, with thermometer ranging from 95° to 102° for fifteen days. *Lee*: Hot weather has checked the advanced cotton. *Wilkes*: Heat almost unprecedented; forward cotton stripped of everything but the few large bolls. *Johnson*: Cannot fully recover from the injury caused by dry weather. *Muscogee*: Rust is spreading over the crop, and fears are entertained of the caterpillar. *Wilcox*: Cut off by oppressively hot, dry weather. *Baker*: Rust has appeared; crop opening rapidly; this is our best cotton month. *Early*: Rust has appeared on highly-manured cotton and may injure the good prospect materially. There is a fair crop of matured bolls on the cotton attacked. *Lincoln*: Severe drought has checked growth and caused much shedding of leaves and forms. Where planted early it was matured before the drought. *Laurens*: Drought, which still continues, has damaged the guano-fertilized cotton. *Pulaski*: Rust has appeared and the heat is intense; the crop may be injured to an alarming extent. *Ware*: Promises well.

FLORIDA.—*Jackson*: Fine and promising; worms have made their appearance, but rust is more injurious than the caterpillar. *Leon*: Caterpillars reported, but not much damage anticipated; picking will begin next week. *Alachua*: Cotton-crop materially injured by heavy rains. *Marion*: Heavy rains are causing shedding of fruit and making way for that pest of Florida, the caterpillar.

ALABAMA.—*Calhoun*: Cotton prospect unusually fine up to 10th of July. Since then drought and unusually hot weather somewhat injured vegetation; late rains have revived the plants. *Saint Clair*: Hottest summer for eighteen years. *Coffee*: Hot weather has caused the cotton to shed and rust has attacked it in some localities; some reports of fly or moth being seen. *Clarke*: Cotton needs rain. *Bullock*: Rust has appeared, and on light lands is causing some shedding of squares. Caterpillars have appeared, but no damage is apprehended. *Colbert*: Cotton is exceedingly promising. *Conecuh*: Doing well; opening very fast, and picking will commence in a few days. *Covington*: Caterpillar in some localities, but little damage as yet; some complaint of rust and some of lice. *Dallas*: Maturing rapidly and the promise good. Some local injury from caterpillars. *Greene*: Prolonged drought is beginning to tell on the cotton. *Lovander*: Badly damaged by drought; but the greatest damage was the "hot wave" from 18th to 27th of July, causing it to cast its forms. *De Kalb*: Cotton, greatly improved. *Perry*: Boll-worm some doing damage; crop ten days earlier than usual. *Crenshaw*: Fair prospect for a large yield. *Barbour*: Complaint of rust, and the caterpillar-fly numerous in some localities and the caterpillar in some sections.

MISSISSIPPI.—*La Fayette*: Yield depends materially on the August weather. Incessant rains during early part of July were unfavorable to the crop, causing shedding of squares. *Amite*: With favorable season for maturing, may have more than an average crop. *Grenada*: Too much rain during June and now too little. *Coahoma*: Finer prospect than for many years. *Lee*: Present prospects are a little more flattering; twenty days dry weather; but rains of a few days since have caused rapid growth and fruiting. *Le Flore*: Seriously damaged by continued rains. *Lowndes*: Prospect poor. *Madison*: Heavy rains in July have damaged cotton; not more than two-thirds of a crop will be made under most favorable circumstances. *Marshall*: Unprecedented high temperature, but cotton has suffered the least of all crops. *Tippah*: Better than in the last two years. *Yazoo*: Rains and hot dry weather have caused much shedding; generally "laid by" full of grass, which will cause bad picking. *Clarke*: Those who subsoiled, fertilized, and worked well have prospects of a good crop. *Claiborne*: Favorable weather for cotton. *Lauderdale*: As favorable as I have ever known. *Noxubee*: A pending drought may reduce condition. *Holmes*: Improved, though shedding much in places. *Neshoba*: Improved wonderfully; healthy and growing fast.

LOUISIANA.—*Concordia*: Hot weather has caused much shedding; worms are reported in small numbers; crop injured about 20 per cent. by rains and drought. *Madison*: Decided improvement since last report. *Caddo*: Continued rains have caused cotton to grow to weed without making the usual amount of forms; the worm has made its appearance in some localities, but has done no damage so far. Everything depends upon the season from this out. *Franklin*: Slightly injured; reports of "worms" are rife, but are believed to be sensational. *Saint Landry*: Yield promising.

TEXAS.—*Washington*: Much rain; boll and grass worm; no damage; plant heavily fruited and growing rapidly. In this county 500 pounds (one bale) to the acre may be safely predicted. *Dallas*: Weather favorable since July report. *Anderson*: Cotton-crop more promising than for several past seasons. *Bell*: Four weeks earlier than last year. *Kendall*: Promising, with no sign of the worm. *Polk*: At least three weeks earlier; worms in small numbers. *Austin*: Excessive rains have caused undue development of wheat weed and shedding of middle crop of fruit; worm has appeared in a few fields. *Medina*: Cotton has a good stand and promises well. *Red River*: Growing fast. *Van Zandt*: Cotton doing remarkably well. *Comal*: Needs rain badly. *Hunt*: About 30 per cent. of acreage turned out. *Waller*: Luxuriant yield, but scarcity of fruit. *Bastrop*: Doing finely. *Bowie*: Crop exceedingly fine; some new varieties promise one bale per acre. *McLennan*: Needs rain badly. *Nacogdoches*: Cotton has been well cultivated, well formed, and is considered the best raised in five years; the boll-worm has appeared, but no damage reported.

ARKANSAS.—*White*: Heavy rains, which will tend to damage the crop. *Woodruff*: Some complaint of rust and blight. *Jefferson*: Much lost in grass and drowned out. *Nevada*: Has improved. *Prairie*: Weather extremely hot and dry; may yet gather a good crop with a favorable season. *Ashley*: Uplands 50 per cent. better than lowlands. *Pope*: Cotton has improved in the last three weeks. *Union*: Promising. *Crawford*: Looks well, but depends upon the usual contingencies. *Cross*: The weather is now favorable to cotton. *Little River*: Improving; crop clean and laid by. *St. Francis*: Crop prospect very flattering, but this is a critical time for it, and dry weather or too heavy rains may cause injury. *Miller*: Prospects nearly as good as last year.

TENNESSEE.—*Fayette*: Has the rust, and in danger of injury from dry weather. *Putnam*: Good, and promises an excellent yield.

CORN.

The general average of the condition of corn on the 1st of August was 96 against 95 in July. An advanced condition is noted in all the New England and Middle States except Pennsylvania, in which there is a slight decline. The slight improvement in Maryland and Virginia is not sufficient to counterbalance the decline in the other South Atlantic States. On the Gulf coast the small

deficiency of Alabama and Louisiana is more than compensated by the advance in the other States of this region, especially in Texas. Arkansas reports an improved condition, but the other Southern inland States have fallen off. North of the Ohio River, Illinois reports the same average as in July, but all the other States of this region have advanced, as have all the States west of the Mississippi except Missouri, which shows some decline.

Of 1,084 counties reporting the condition of corn in August, 284 report a full average condition, 304 above, and 446 below, as shown in the following table:

States.	Averaging 100.	Averaging under 100.	Averaging over 100.	Total.	States.	Averaging 100.	Averaging under 100.	Averaging over 100.	Total.
Maine	1	3	6	10	Texas	6	4	33	43
New Hampshire	3	2	2	7	Arkansas	13	4	14	31
Vermont	3	6	1	9	Tennessee	9	18	11	38
Massachusetts	1	1	1	3	West Virginia	9	19	3	31
Rhode Island	1	1	1	3	Kentucky	19	16	8	43
Connecticut	2	1	2	5	Ohio	16	32	10	58
New York	14	17	5	36	Michigan	14	10	8	32
New Jersey	2	2	2	6	Indiana	10	24	6	40
Pennsylvania	6	31	3	40	Illinois	15	38	6	59
Delaware	1	1	1	3	Wisconsin	9	9	5	23
Maryland	4	7	2	13	Minnesota	6	3	19	28
Virginia	15	35	6	56	Iowa	21	11	22	54
North Carolina	8	43	4	55	Missouri	21	25	17	63
South Carolina	5	7	6	18	Kansas	9	7	17	33
Georgia	9	38	25	72	Nebraska	3	4	19	26
Florida	7	5	4	16	California	8	2	2	12
Alabama	7	9	12	28	Oregon	1	1	1	3
Mississippi	5	11	15	31	Total	284	446	304	1,034
Louisiana	4	1	8	13					

The conditions of growth through the corn-growing region have been, on the whole, quite favorable, though in large sections they have been, to other cereals, very unfavorable and even disastrous. A careful analysis of our returns shows that favorable and unfavorable conditions in July distributed themselves in zones and sections. In the New England States, where the crop has been brought nearly up to a full average condition, drought is complained of in the northern counties, while unusually favorable weather was common in the southern part. Cut-worms are reported in Grand Isle, Vermont, in late-planted crops. In the northern portions of the Middle States the unpropitious early season has still left traces of its depressing influence, and drought is complained of in some quarters, but on the whole the crop of this region made an unusual growth in July. Grub-worms did considerable damage in Washington, New York. Throughout the South the alternations of dry weather and rain caught the crop in different stages. In the South Atlantic States the season was generally more beneficial to later plantings, while in the Gulf States the larger proportion, being early planted, enjoyed an exemption from the disasters which affected late crops. The tone of reports is remarkably cheerful in Texas, where several correspondents speak of the season as the most propitious for many years. In the Southern inland States the same varied conditions are reported; drought and wet weather alternating in contiguous belts of territory. Grainger, Tennessee, reports damages by cut-worms; in Jeffer-

son, West Virginia, wire-worms, grubs, and heart-worms were more or less injurious.

In the southern counties of States north of the Ohio River there is the same alternation of wet and dry weather as in the States southward, while in the Lake region the crop, though backward, is generally growing rapidly. In some cases, where the ground was plowed wet in the fall and did not receive the ameliorating influence of frost in the winter, the promise of July is not maintained. The advantages of thorough draining and culture are attested in the superiority of crops so treated. West of the Mississippi the most remarkable feature of the season is the abundance of moisture in what was once called the "Great American Desert." It is somewhat surprising to read of crops injured by excessive rain in Kansas. An occasional report of injury by chinch-bugs is noted in the southern counties, where the rain-fall was short. The small crop of the Pacific slope is in good condition, especially on lands well irrigated. The following notes are appended:

MAINE.—*Androscoggin*: Suffering for rain.

NEW HAMPSHIRE.—*Cheshire*: Good, except in some places injured by June frosts. *Rockingham*: Not promising; nearly stopped growing.

VERMONT.—*Rutland*: Short and backward; very hot and dry July. *Grand Isle*: Late planted and some injured by cut-worms. *Orleans*: Has slowly recovered from frost of June 7, but is a poor stand; generally not promising.

MASSACHUSETTS.—*Berkshire*: Backward on account of cool May, but promises heavy crop.

CONNECTICUT.—*Windham*: Made a surprising growth during hot weather of July.

NEW YORK.—*Broome*: Seriously retarded by cold rains in May and June. *Washington*: Damaged by grubs. *Saint Lawrence*: Injured by cold rains and frosts at the start and by drought since. *Suffolk*: Damaged by late frosts. *Wyoming*: Has come on very rapidly and now in good condition. *Genesee*: Of good growth, but late.

NEW JERSEY.—*Burlington*: Has suffered from drought, though recent rains improve the prospect. Somewhat later than usual. *Atlantic*: Prospect very flattering. *Warren*: Weather very favorable.

PENNSYLVANIA.—*Bedford*: Some fields attacked by frost. *Clearfield*: Will be light. *Chester*: Early planted good. *Butler*: Wonderful improvement since July 1. *Cambria*: Coming forward very fast. *Elk*: Late and uneven. Proper cultivation out of the question. *Indiana*: Promise of a fine yield. *Fayette*: Greatly improved and now promises well. *York*: Injured by drought. *Lycoming*: Thin on the ground, owing to cold, wet weather during planting season. *Sullivan*: Made an unusual growth in July.

MARYLAND.—*Washington*: Backward, but improved by recent rains. *Wicomico*: Not materially injured. Will make full crop if season is late enough. *Worcester*: Suffering from excessive drought. *Calvert*: Suffered from July drought. *Harford*: Improving.

VIRGINIA.—*Fairfax*: Needs rain. Scarcely half crop from present indications. *Isle of Wight*: Suffering from drought. *King and Queen*: Looks promising, with favorable weather. *Loudoun*: Planted late and growth retarded by dry weather. *Caroline*: Being injured by drought. *Craig*: Late, but making rapid growth. *Halifax*: Season unfavorable; crop suffering for rain. *Mecklenburg*: Suffering from severe drought. *Orange*: Generally late, but promising. *Prince William*: On high land improved by late rains. Much on low lands abandoned to weeds. *Amelia*: Will be cut short by drought. *Campbell*: The greater part looking badly. *Nansemond*: Injured by drought. Recent rains will make the late corn and possibly restore the early crop. *Tazewell*: Hope to make over half a crop as the season is now favorable. *Montgomery*: In one-half of this county seriously injured by drought; weather now seasonable, but too late to bring corn up to full average. *York*: Will not make more than half crop under most favorable circumstances. *Dinwiddie*: Favorable season and corn improving. *Madison*: Rather backward. *Middlesex*: Very seriously

injured by dry weather. *Northumberland*: Suffering for rain. *Richmond*: Unfavorable, but has taken a start from recent rains. *Fluwanna*: Very good. *Wise*: Crop far short of last year.

NORTH CAROLINA.—*Forsyth*: Promising. *Bertie*: Cut short by drought. *Davie*: Crop injured by drought at least one-fourth. *Duplin*: Badly injured by drought, except where well cultivated. *Martin*: Has suffered from dry weather; season now more favorable. *Nash*: Early planted short; the late doing well. *Pasquotank*: Rains too late; not over half a crop. *Stokes*: Seriously injured by hot, dry weather. *Caswell*: Damaged materially by drought. *Chatham*: Cut very short by drought. *Columbus*: Over an average July 1, but seriously injured since by drought. Rains too late for early crop. *Granville*: Crop very unpromising. *Union*: Good rains; crop now bids fair to be above an average. *Wake*: Early corn literally destroyed by drought; late looks fair since last rain. *Rowan*: Has improved immensely during the last two weeks. *Beaufort*: Injured by drought, but much improved by late rains. *Alamance*: Late planted and kept back by drought. *Bladen*: Much corn entirely dead. Cannot hope for more than half a crop. *Burke*: Bad stand on low ground; crop generally backward. *Camden*: Injured by rain in the spring and by drought in June and July. *Gates*: Much improved by recent rains. *Greene*: Injured by drought. *Wilson*: Injured by drought. *Wilkes*: Injured by dry weather. *Pitt*: Destructive cyclone, August 2, damaged corn beyond the hope of recovery.

SOUTH CAROLINA.—*Union*: The northern section of the country, has suffered from six weeks, drought. *Williamsburg*: Season remarkably favorable, except for late planted. *Darlington*: Has no serious drawback at this time; season favorable. *Edgefield*: Injured fully 25 per cent. by drought. *Fairfield*: A good crop fully made. *Horry*: Materially injured by drought just at filling time. *Laurens*: Much of the crop injured beyond recovery by drought. *Lexington*: That planted in May will yield very little; earlier planted good. *Marion*: Early crop now made and very fine; late crop, planted in June after wheat and oats, is promising. *Newberry*: Suffered some from drought; rain came in time to make first planting. *Clarendon*: Pretty well matured and finest crop for years. *Georgetown*: Badly hurt by drought; late crop improved by recent showers.

GEORGIA.—*Cobb*: Very promising early in the season, but now cut short about one-third by drought. *Gwinnett*: Injured by drought and hail. *Habersham*: Crop injured by dry weather of July. *Hart*: A fine prospect, although somewhat injured by drought. *Richmond*: Early planted unusually good; late planted injured by drought. *Troup*: Fired badly; much of the crop withered and dropped down; too late to be relieved by rain. *Union*: Was promising, but now suffering from drought. *Jackson*: Injured at least a third by drought. *Marion*: Late corn nearly a total failure; crop was injured by drought and hot winds; rain could not now save it. *Thomas*: A good crop already made. *Gordon*: Some dying for want of rain. *Upson*: Suffering from drought. *Worth*: Better than ever known. *Hancock*: Crop cut off about one-third by drought. *Baldwin*: That planted early in March is good; late crop literally burned up. *Floyd*: Early crop about made; late crop, failure inevitable. *Forsyth*: Injured by drought. *Johnson*: Some of the late corn dead from drought. *Lee*: Fine and very heavy. *Taylor*: This crop materially injured by drought. *Wilkes*: The very forward only slightly injured; late crop almost entirely ruined. *Baker*: Crop made and best for several years. *Lincoln*: All late corn, and that on upland generally, a failure; some injured by bud-worm. *Stewart*: The best average crop for years. *Ware*: Promises largely.

FLORIDA.—*Jackson*: Far advanced and a large yield certain. *Manatee*: Very nearly a failure.

ALABAMA.—*Calhoun*: Unpromising since the 10th of July. *Coffee*: Prospect of an abundant crop; the early planted already safe. *Clarke*: Crop made and generally good. *Baldwin*: Early crop has done well; the late quite poor. *Colbert*: Finest prospect ever known. *Covington*: Beginning to ripen; quality excellent. *De Kalb*: On mountain lands remarkably good. *Greene*: Injured by prolonged drought. *Crenshaw*: The best crop for several years. *Morgan*: Wilting from drought. *Perry*: Generally good; the best average for several years.

MISSISSIPPI.—*La Fayette*: Early corn the main crop; good, and made by rains of first half of July. *Grenada*: Early crop very fine, equal to any in five years; late crop not so promising. *Coahoma*: In some places suffered from drought and in others from a superabundance of rain. *Lee*: On rich bottom lands ruined by rain; on light rolling lands good. *Leake*: Very good on uplands and very poor on "reed brake" and swamp lands. *Neshoba*: Has not recovered from heavy rains of May and June. *Lauderdale*: Condition favorable and crop now safe; as good as ever known. *Tippah*: Better than for two years. *Noxubee*: Late planted suffering from drought. *Holmes*: Much of the crop blown down by heavy winds.

LOUISIANA.—*Madison*: A decided improvement in late crop since last report. *Union*: The present will be the heaviest crop ever raised in this parish. *Saint Landry*: Ripe, and over an average.

TEXAS.—*Washington*: Crop good and ready to harvest. *Dallas*: Never better; will average 40 to 60 bushels per acre. *Anderson*: The best crop for ten years. *Bell*: Has not been better for years. *Kendall*: Largest crop ever known. *Polk*: Good. *Austin*: Except on uplands of the southern section, the crop is abundant. *Red River*: Very fine. *Live Oak*: Very good and ready to be gathered. *Nacogdoches*: Excellent.

ARKANSAS.—*Jefferson*: Yield heavy where not drowned out. *Prairie*: Early crop safe; late crop injured beyond recovery. *Stone*: Damaged by drought. *Ashley*: On upland better than ever known; not half crop on low land. *Crawford*: Good and already made. *Cross*: A falling off in corn by drought. *Garland*: Rain in March and April caused a "spindling stalk," but crop better than an average. *Pope*: Very fine.

TENNESSEE.—*Sequatchie*: Was injured to some extent, but now very fine. *Grainger*: Cut-worm and bud-worm prevented a good stand; crop has been well worked, and now promises an average yield. *Blount*: Needing rain badly. *Greene*: Cut short by drought; much of it past recovery. *Sevier*: Looking fine. *Jackson*: Looks better in this county than for many years. *Loudon*: Suffering for rain.

WEST VIRGINIA.—*Jefferson*: Injured by wire-worms, grubs, and heart-worms; growth retarded by drought. *Raleigh*: Reduced below average by drought. *Morgan*: Injured by drought since July 1. *Marion*: Weather very seasonable; fine growing rains. *Braxton*: Very promising. *Putnam*: Shortened by drought. *Greenbrier*: Too cold in June and too hot in July, baking the ground; late rains starting the crop finely.

KENTUCKY.—*Shelby*: Early planted considerably fired; late planted had more rain, and hence greatly improved; one or two more rains will make the crop. *Logan*: Injured by excessive rains in June and July, preventing the working of the crop. *Anderson*: Promises to be the best crop for years. *Nicholas*: Injured by drought, but revived by late rains. *Daviess*: Injured by heat and drought. *Cumberland*: Fine and well cultivated. *Graves*: Injured by wet. *Russell*: Injured by severe drought; not over a half crop possible.

OHIO.—*Montgomery*: Late rains may make a good crop, though shortened by previous drought. *Erie*: Badly blown down. *Adams*: Uneven, and at least two weeks late; shortened by drought. *Perry*: Late rains and hot weather have accelerated a slow start. *Hardin*: Damaged to a great extent by heavy rains following drought. *Noble*: Injured by drought. *Morrow*: On suitable ground, properly cultivated, corn made a very fine growth in July. *Clark*: Doing finely. *Ross*: Materially shortened by drought. *Logan*: Very greatly improved with later fine season. *Preble*: Wonderful growth during July. *Monroe*: Greatly improved; promises an average crop. *Athens*: Reduced by drought in July; hill corn will be very short. *Delaware*: A large average and good stand, but injured by wet on lowest and best lands. *Holmes*: Backward, but growing rapidly in the fine weather. *Lorain*: Rapid growth in July. *Meigs*: Injured by the hot and dry July. *Williams*: Color remarkably good, though the growth is not very large; earing very well. *Ashtabula*: Started late and grew slow, but making good time now; large crop.

MICHIGAN.—*Kalamazoo*: Not recovered from the unfavorable conditions of early spring. *Oakland*: Looks fine, especially early plantings. *Mecosta*: Doing well.

INDIANA.—*Whitley*: Grows well, though the wet weather has prevented working. *Huntington*: Backward, but growing finely. *Dearborn*: Late hot weather pushing the crop very

fast, but dry and hot in some localities. *Carroll*: Very much injured by wet weather. *Grant*: Low, on account of drought. *Steuben*: Never looked better; weather all that could be desired. *Putnam*: Short; dry. *Hamilton*: Much corn light. *Franklin*: Good on bottoms, but poor on uplands.

ILLINOIS.—*Logan*: Not so promising as a month ago; soil worked while wet last year, and not ameliorated by frost in the winter; crop has not yet recovered from the early spring weather. *Pike*: Late planted on account of excessive rain, and neglected at a critical time for wheat harvest; heat and drought have injured it, but still it may reach an average. *Tazewell*: Prospect fallen from 50 or 75 bushels per acre to 35. *Ford*: Low prospect; bad planting time. *Woodford*: Half crop in prospect. *Lee*: Late hot weather has greatly improved the crop. *Madison*: Where not injured by wet in the spring the crop is good. *Mason*: July injuriously dry. *Vermillion*: Brought out finely by late heavy rains. *Boone*: Needs rain badly. *Carroll*: Hot and moist; fine corn weather. *Clark*: Early plantings good; late plantings weedy. *Fullon*: Fine growing weather. *Hamilton*: Shortened by July drought. *Hancock*: Season not favorable. *Jefferson*: Improved greatly with late rains. *Marshall*: Stands uneven, but frequent rains and favorable weather are bringing it out. *Montgomery*: Early corn ruined; late may be saved. *Ogle*: Greatly improved. *Piatt*: Low-land crops drowned out; hill crops injured by a terrible rain storm to the extent of 20 per cent. *Putnam*: Suffered from drought, but good rains have come. *Sangamon*: Injured by drought. *Edwards*: Good, but in some places needs rain.

WISCONSIN.—*Dodge*: Very backward, but started finely with the late warm weather. *Jefferson*: Coming on finely. *Rock*: Benefited by late rains and will be good. *Green*: Fine growing weather. *Waukesha*: Very fine.

MINNESOTA.—*Olsted*: Looks well. *Pope*: Does well; blackbirds and gophers took a considerable quantity of the seed. *Redwood*: Backward, but advancing in the recent warm weather. *Isanti*: Filling out rapidly. *Steele*: Promises a superior crop, but is very weedy. *Wright*: Large growth, but will be shortened by the intense heat.

IOWA.—*Benton*: Good. *Polk*: Promise nearly equal to last year. *Decatur*: Crop simply immense. *Des Moines*: Wet weather followed by severe drought in July greatly injured the crop. *Linn*: Backward till July 1, but has since come forward wonderfully. *Madison*: Damaged by heavy storm July 31. *Marion*: Promises an extraordinary yield. *Muscatine*: Crop immense. *Guthrie*: Rather weedy owing to wet weather; some blown down by storms. *Howard*: Greatly improved by the hot weather. *Mills*: Greatly improved. *Monona*: Wonderfully improved.

MISSOURI.—*Chariton*: Saved by late rains. *Nodaway*: Doing well; plenty of heat and moisture. *Putnam*: All conditions of growth unprecedentedly favorable. *Randolph*: Greatly improved by late quiet and copious rains. *Moniteau*: Suffering badly from drought. *Adair*: Needs rain. *Caldwell*: Early planted doing very well. *Callaway*: Badly needs the rain just falling; too late to make a good crop. *Macon*: Injured in some localities by drought, but still a fine prospect. *Mississippi*: Injured by July drought. *Newton*: Early corn nearly made; the crop will be heavy. *Perry*: Injured by drought. *Maries*: Damaged by heat. *Vernon*: Coming out finely: rains plentiful. *Lincoln*: Upland corn parched up; many fields will yield nothing. *Knox*: Injured by drought.

KANSAS.—*Neosho*: Promising. *Franklin*: The fourth successive good crop; injured on low lands by excessive wet. *Nemaha*: Very good. *Johnson*: Late plantings affected by drought. *Douglas*: Flourishing in its prime. *Ellis*: Never so promising. *Labette*: Beyond expectations. *Marion*: Suffering from July drought. *Woodson*: Damaged by wet weather. *Chase*: Injured on wet land; on dry land splendid. *Cherokee*: Early plantings fine; much needs to be replanted. *Montgomery*: Wet season prevented working till wheat harvest caused it to be still further neglected.

NEBRASKA.—*Hall*: Growing splendidly, but backward. *Clay*: Wonderful growth in July; rain and heat enough; quality good. *Gage*: Attacked by chinchies, but saved by rain. *Suunders*: Injured by excessive rain and heat, especially on flat lands. *Wayne*: Full and fine.

CALIFORNIA.—*Siskiyou*: Did well with irrigation.

SPRING WHEAT.

The month of July brought a serious disaster to the spring-wheat crop of the Northwest. Correspondents in that region speak of the "hot wave" passing over their fields and inflicting more or less damage upon the crop. In several cases the crops of whole counties are nearly destroyed, while in others the yield is greatly reduced both in quantity and quality. About a third of the wheat crop of Illinois is spring sown. Here complaints of rust, blight, and ravages of chinchies are quite numerous. Our correspondent in Fulton realized but $5\frac{3}{4}$ bushels per acre for spring wheat, while his winter wheat netted $22\frac{3}{4}$. This, he thinks, fairly represents the relative value of the two crops in his section. In Wisconsin the same disastrous agencies depressed the crop and were accompanied by a greater variety of insect damages. The weevil was developed after cutting in some places. In some counties in Minnesota it is noted that the grain ripened from the top downwards, leaving the stalk rank and green, while the head was "baked" and white. Later sowings were especially damaged by the heat. Storms of wind, rain, and hail caused many fields to lodge badly, and also damaged the wheat in the shock. The rain frequently delayed harvest till the grain was overripe. In Iowa the same general conditions prevailed, many crops being blighted by extreme heat and others injured by rain at or just before harvest. Late-sown fields whitened suddenly at the top and were ready for harvest as soon as the earlier. Nebraska suffered less than her sister States of the Northwest, but still her general average is reduced about 10 per cent. In California the conditions of growth were also greatly deteriorated during July. Complaints are rife of rust, of excessive rain drowning the crop, and of cheat supplanting the grain. In San Luis Obispo two-thirds of the crops on the western slope of the coast-range were destroyed by rains and fogs, while on the eastern slope, in the valley of the San Joaquin, the crops were very fair. In New England the crop held its own during July, but fell off somewhat in the Middle States. The general average of the spring wheat region in July reached the unprecedented figure of 106, but it will not be safe to estimate the general average of August at more than 75—that of the Northwest and California being a little over 70.

The following notes from correspondence are added:

MAINE.—*Piscataquis*: Early sown nice plump grain and full to the ends of the heads; late sown not good; in many places badly eaten by worms. *Cumberland*: To some extent affected with rust.

VERMONT.—*Grand Isle*: Considerably injured by Hessian fly. *Orleans*: Well filled; no rust or midge.

NEW YORK.—*Genesee*: Mostly destroyed by Hessian fly.

PENNSYLVANIA.—*Sullivan*: Poor; grain shrunk; straw weak and broken.

VIRGINIA.—*Orange*: But six bushels of spring wheat sown in the county; result naught.

SOUTH CAROLINA.—*Newberry*: Poor and grain light.

TEXAS.—*McLennan*: Did not yield well.

MICHIGAN.—*Mecosta*: Spring wheat doing nicely.

INDIANA.—*Carroll*: Spring wheat a failure. *Stauben*: Spring wheat poor; this county not adapted to its culture.

ILLINOIS.—*Lee*: Spring wheat greatly injured by chinchies. *Ford*: Spring wheat slightly rusted. *Mason*: Does not yield as well as anticipated. *Fulton*: Spring wheat a failure. Our correspondent thrashed 46 bushels of poor spring-sown grain from 8 acres, while he obtained 91 bushels of the best winter wheat from 4 acres. These results he thinks fairly represent the value of the two crops in the county. *Ogle*: Spring wheat damaged by chinch-bugs and rust. *Putnam*: Spring wheat good.

WISCONSIN.—*Washington*: "Mammoth" spring wheat a full crop; other varieties damaged by rust, and a small yellow worm; a most promising crop cut down one-half. *Juneau*: Spring wheat cut down 50 per cent. by the hot wave of July. *Iowa*: Spring wheat almost a total failure. Winter wheat better than for twenty years. *Watworth*: Spring wheat has failed to realize its early promise; some fields very good and others not worth cutting; injured by hot weather. *Dodge*: Many pieces ruined by heat. *Door*: Weevil injurious in the southern part of the county. *Sauk*: Spring wheat injured by rain. *Green Lake*: Rust and extreme heat very injurious; crop running to straw. *Rock*: Spring wheat injured by hot weather. *Calumet*: Injured by extreme heat, weevil, and chinchies. *Green*: Damaged by heat. *Waukesha*: Injured by heat. *Outagamie*: Excessive rain, heat, and weevil; greatly damaged. *Brown*: Injured by heat and weevil.

MINNESOTA.—*Lyons*: Crop cut down half by extreme heat. *Olmsted*: Spring wheat a failure; much will not be harvested; yield not over 8 or 9 bushels per acre; rust and blight. *Pope*: Injured by overgrowth in the late warm weather; much of it lodged and expensive to harvest; poorly filled; rust and smut; heads and straw both very uneven. *Redwood*: Badly lodged by heavy rain and wind storm; late sowing much shrunken in the grain by recent hot weather. *Sherburne*: Reduced a third by heat, smut, and blight; excessive heat caused the grain to ripen too fast, from the top downwards; that is, the wheat was baked in the head while green in the straw. *Wadena*: Harvest disappoints expectations. Extreme heat brought smut; heads short; crop frequently thin and weedy; yield not over two-thirds of that of last year. *Winona*: Spring wheat blighted, lodged, and shrunken. *Nobles*: Suffered from climatic causes. *Dodge*: Light and poor. *Freeborn*: Splendid prospect ruined by rain and heat. *Isanti*: Heavy showers at harvest. *Le Sueur*: Badly injured by rain; much blight. *Nicollet*: Badly lodged; did poorest on rich and well cultivated soil; struck with rust; thin on the ground; but hot weather blighted it; whole fields will not be cut; what is harvested will grade low. *Steele*: Suffered from extreme heat and blight; will grade low; late sowing affected least. *Watonwan*: Largest growth of straw on record, causing it to lodge badly; average five to ten bushels per acre. *Wright*: Heavy straw; light heads; pinched grain; *Yellow Medicine*: Heavy straw and lodged by rain. *Todd*: Largely down.

IOWA.—*Benton*: Spring wheat cut down 25 per cent. by hot weather. *Black Hawk*: A fine promise cut down by heat and blight. *Cerro Gordo*: A splendid crop almost ruined by extreme heat in July. *Fremont*: Injured by delay in cutting, caused by wet weather; damaged by rain in the shock. *Hardin*: Badly blighted by heat. *Humboldt*: Almost ruined by blight. *Polk*: Badly rusted. *Allamakee*: Spring wheat blighted by excessively hot and wet weather; a disastrous failure in prospect; a large area will not be cut; average yield estimated at four bushels per acre. The "Lost Nation," introduced this spring, is a total failure. The Red Odessa will make three-fourths of a crop; it is proof against insects. It was sown as an experiment late in the fall with excellent results. *Clinton*: Spring wheat greatly injured by blight and chinchies. *Des Moines*: Spring wheat half a crop of inferior quality. *Floyd*: Badly injured by extreme heat; many fields whitened off at once; last grain ready for the sickle as soon as the earlier grain; baked in the top. *Hancock*: Almost destroyed by rain or heat. *Jefferson*: Average. *Kossuth*: Has suffered greatly from blight. *Lynn*: Spring wheat suffered greatly from heat. *Madison*: Damaged by rain and heat just before ripening. *Mahaska*: Prospect of the largest wheat crop ever raised here; was cut down by heat of July 4th to 20th; early sown escaped, the late suffered severely. *Marion*: Rust not so severe as was supposed before harvest; most of the early sown has done well, with sound plump grain; late sown injured by the chinch-bug; most of the crop sown early. *Mitchell*: Extreme heat and wet weather has blighted, rusted, and scalded spring wheat to a great extent; some chinchies. *Montgomery*: Injured, especially by chinchies, which made it

crinkle; harvest delayed by rains. *Muscatine*: Heat ripened wheat too fast, injuring both quantity and quality. *Sioux*: Badly laid by winds, making harvesting difficult and spoiling the grain. *Taylor*: Injured by wet weather; many fields down and rotting. *Ida*: Blighted by heat and rain, especially bald wheat. *Audubon*: Some fields good; in others grain much shrunken. *Cherokee*: Injured by heat and storms. *Emmett*: Excessive heat and rain injured the crop. *Franklin*: Badly blighted in many places, and will not pay for cutting. *Guthrie*: Shocks in the field badly scattered by storm; loss from one-third to one-half of the crop. *Howard*: Excessive wet and sultry weather has injured the crop. *Lyon*: Wheat injured by rust and heat; crinkled. *Monona*: Injured by heat. *Mills*: Injured by rain.

NEBRASKA.—*Richardson*: Spring wheat badly rusted; rainy harvest weather. *Cedar*: Rust and blight in July. *Hall*: Rusted. *Johnson*: Not well secured and in danger of spoiling in the stack from rain; injured also by hail. *Clay*: Fine, twelve to twenty-five bushels per acre; suffered from rain, but is still in an unusually good condition. *Gage*: Injured by rain, especially the China tea wheat; much wheat down, making it difficult to harvest. *Saunders*: Injured by excessive rains; on flat lands fully 25 per cent. *Wayne*: Damaged by rain; many fields uncut; ground too soft to run machines. *Cass*: Cut down a fourth by rust and storms. *Nemaha*: Injured by rain in harvest. *Seward*: Early cut fields did well, but others poorly; a splendid prospect ruined by heat.

KANSAS.—*Nemaha*: Spring wheat badly rusted. *Saline*: Spring wheat 30 per cent. better than last year. *Ellis*: About twenty bushels per acre and good in quality. *Marion*: Spring wheat rusted and almost a total failure; many fields not cut. *Chase*: Spring wheat a failure in this county.

CALIFORNIA.—*Santa Clara*: Considerably injured by rust, or a peculiar foul growth or blight noticeable especially in late-sown grain. *Placer*: Thrashing out better than was supposed. *Stanislaus*: Not thrashing up to expectations; grain foul and a little shrunken. *San Luis Obispo*: Yield less than expected by half. On the western slope of the coast range two-thirds of the crop destroyed by rain and fog; on the eastern slope a fair yield.

SPRING RYE.

The condition of spring rye for the whole country is better than at this date last year. In the States where this crop is the most extensively grown, Minnesota averages 104, one per cent. lower than last year; Iowa, 95, four per cent. lower; Nebraska, 98, eleven per cent. lower; California, 92, twenty-six per cent. lower. California presents the lowest average this year, 92, and Minnesota the highest, 104, while Maine, New Hampshire, Vermont, Rhode Island, Pennsylvania, Texas, Wisconsin, and Missouri average 100 and above.

OATS.

The condition of oats, as shown by our August returns, is represented by 100, the average of July being 101. This crop also suffered from the extreme heat and other unfavorable influences of July. All the Atlantic States north of South Carolina, except Massachusetts and Connecticut, show a decline, which is especially marked in Delaware, where the average is but 70 against 108 in July. The growth of the plant in some counties was stunted by drought and caused to rust by excessive rain in others. The crop ran to straw and the heads filled poorly. In Cecil County, Maryland, average weights per bushel in different fields ran as low as 16 pounds. South Carolina, Georgia, and Florida show an improvement. The "rust-proof" variety here seems to have vindicated its claim to the title. Winter sowing also has given an increased vitality to the crop, enabling it to ripen in time to evade the usual disasters of

later spring and summer weather. Of the other Southern States, Alabama, Mississippi, and Arkansas show a decline, while Louisiana, Texas, and Tennessee raise their standard. In the Ohio Valley, West Virginia and Kentucky fall off from their previous high figures. Of the States north of that river, Ohio, Michigan, and Missouri show improved condition, while all the others report a decline, as also does California. The crop enjoyed varied conditions of growth in the Mississippi Valley and on the Pacific Coast. The extreme range of variation was between 70 in Delaware and 113 in Tennessee, but most of the States ranged between 105 and 95. The following table gives the number of counties reporting this crop, classified according to the condition of the crop:

States.	100.	Under 100.	Over 100.	Total.	States.	100.	Under 100.	Over 100.	Total.
Maine	3	5	2	10	Texas	7	15	9	31
New Hampshire	1	3	3	7	Arkansas	8	6	11	25
Vermont	3	5	1	9	Tennessee	8	4	19	31
Massachusetts	1	1	1	3	West Virginia	9	3	18	30
Rhode Island	1			1	Kentucky	13	3	26	42
Connecticut		1	4	5	Ohio	19	6	33	58
New York	13	12	11	36	Michigan	14	13	8	35
New Jersey	2		3	5	Indiana	13	3	23	39
Pennsylvania	13	8	19	40	Illinois	22	9	28	59
Delaware		1		1	Wisconsin	4	13	6	23
Maryland	2	5	3	10	Minnesota	4	13	11	28
Virginia	13	12	20	45	Iowa	20	19	14	53
North Carolina	10	18	11	39	Missouri	17	5	39	61
South Carolina	4	1	1	6	Kansas	8	11	10	29
Georgia	8	8	16	32	Nebraska	5	10	11	26
Florida	3	3	4	10	California	3	2	2	7
Alabama	7	3	10	20	Oregon				
Mississippi	8	3	2	13					
Louisiana	3	1	2	6	Total	269	225	381	875

VERMONT.—*Rutland*: Will be light; very hot and dry in July. *Grand Isle*: Injured by drought.

NEW YORK.—*Schoharie*: Short straw, but well filled heads. *Washington*: Sown too late. *Genesee*: Heavy and in splendid condition.

PENNSYLVANIA.—*Bedford*: Very good, and earlier than in former years. *Chester*: Straw well grown, but heads very light. *Butler*: Up to full average. *Cambria*: Good, with less straw than usual. *Elk*: Best yield ever known. *Lehigh*: Suffered from rust. *Greene*: A good crop, and harvested in fine condition. *Sullivan*: The early sown all that can be desired.

MARYLAND.—*Cecil*: Large straw but heads light, and badly filled, in one case weighing but 16 pounds to the bushel, and in another but 17. *Harford*: Materially injured by hot weather.

VIRGINIA.—*King and Queen*: Not good; attacked with rust for the first time in many years. *Loudoun*: A fine crop. *Orange*: Crop a fine one, but much of it being damaged by the rain. *Amelia*: A failure from the rust. *York*: Almost ruined by rust. *Brunswick*: About one-half a crop harvested. *Diwiddie*: Severely injured by red rust. *Gloucester*: Spring oats not worth cutting; winter oats about half a crop. *Madison*: Crop good. *Richmond*: Injured by rain.

NORTH CAROLINA.—*Rowan*: Much under average on account of rust; about one-third fell down before balance ripened. *Montgomery*: About half a crop, owing to rains and rust before maturing.

GEORGIA.—*Madison*: Crop good. *Carroll*: Rust-proof oats very fine; spring oats a failure. *Baldwin*: Crop good. *Wilcox*: A fine crop. *Ware*: Gathered the first of May, and a good yield.

ALABAMA.—*Coffee*: Crop very good. *Barbour*: Crop larger than usual and very good.

TEXAS.—*Dallas*: Injured very much by rain; in many places worthless. *Menard*: Yield fair.

ARKANSAS.—*Jefferson*: Too much rain; crop light. *Stone*: Good in quantity and quality. *Ashley*: Damaged by summer rains. *Garland*: Damaged by rains. *Pope*: Good yield. *Union*: Very good; should be more extensively cultivated.

TENNESSEE.—*Grainger*: The best crop for ten years. *Sevier*: Best crop in ten years. *Morgan*: Was harvested during the first and second weeks in July.

WEST VIRGINIA.—*Marion*: Crop secured in a fine condition. *Morgan*: Injured by severe drought. *Greenbrier*: Injured considerably by falling down.

KENTUCKY.—*Nichols*: Crop fine and well secured. *Graves*: Injured by excess of rain. *Russell*: Best crop yet.

OHIO.—*Coshocton*: A fine crop; good quality and well secured. *Monroe*: Well saved. *Preble*: Mostly in shock; heavy rains. *Ross*: Good; well filled. *Morrow*: Heavy; many fields badly lodged. *Portage*: Never better. *Perry*: Extra heavy. *Erie*: Badly lodged and hard to gather. *Geauga*: Immense crop. *Williams*: Rusted just before ripening and did not yield well. *Mahoning*: In superior condition. *Lucas*: Crop in critical situation; badly lodged by storms and liable to injury from rains. *Lorain*: Injured by heavy rain of July 26; badly laid. *Holmes*: Good.

MICHIGAN.—*Berrien*: Heavy crop. *Manistee*: Good harvest weather. *Oakland*: Shortened by drought. *Mecosta*: Late sown and shortened by extreme heat.

INDIANA.—*Grant*: Extra. *Huntington*: Late crops will be heavy. *Shelby*: Good crop. *Warren*: Did not fill well; too hot and dry. *Steuben*: Crop as good as could be desired. *Putnam*: Will have a large surplus for export. *Hamilton*: A full crop, but light in the grain. *Franklin*: Very heavy straw; good yield of grain.

ILLINOIS.—*Pike*: Fine crop in quantity and quality. *Woodford*: Gathered in fine order. *Lee*: Good in quantity and quantity. *Stephenson*: Lodged by heavy rain-storms. *Vermillion*: Crop heavy. *Boone*: Badly lodged by storms, making it expensive to harvest at \$1.50 per day. *Carroll*: Badly lodged; 20 per cent. lost in harvesting. *Henry*: Light weight. *Jefferson*: Abundant. *Montgomery*: Finest crop for years. *Ogle*: Badly blown down and difficult to harvest. *Sangamon*: Stacking impeded by rains. *Winnebago*: Imperfectly filled; heat and heavy rains. *Edwards*: Good.

WISCONSIN.—*Wauworth*: Full acreage on light soils where wind and rain did not lodge the grain. *Jefferson*: Injured by excessive rains. *Richland*: Badly lodged. *Green*: Too hot. *Waukesha*: Prime.

MINNESOTA.—*Winona*: Fair crop, but badly lodged. *Wadena*: Injured by heat. *Redwood*: Badly lodged but well filled; will have to be stacked unbound. *Olmsted*: Badly damaged by wet and hot weather. *Pope*: Some fields very heavy, others are not well filled, yet the crop is unusually good. *Le Sueur*: Grain good but badly damaged. *Nicollet*: Badly lodged. *Steele*: Full crop. *Todd*: Lodged.

IOWA.—*Hardin*: Rusty and light. *Fremont*: Over ripe; wet weather delayed harvesting and injured the grain in the shock and stock. *Hancock*: Good. *Kossuth*: Considerably blighted. *Mahaska*: Crop heavier than ever known, but the grain is shrunk by excessive heat. *Marion*: Extra in number and weight of bushels. *Cherokee*: Badly lodged. *Howard*: Better than was expected, but many fields flattened by storms. *Lyon*: A promising crop badly lodged. *Mills*: Badly fallen from rain. *Shelby*: Lodged; only half can be saved.

MISSOURI.—*Chariton*: Excellent. *Madison*: Fine. *Nodaway*: Injured in the shock by rain. *Bollinger*: Good. *Caldwell*: Light heads, but straw heavy, caused by rust. *Cass*: Splendid. *DeKalb*: Rusted badly in some sections. *Bates*: Average 50 bushels per acre.

KANSAS.—*Nemaha*: Badly rusted. *Franklin*: A bountiful crop. *Neosho*: Very heavy. *Saline*: One-fifth better than last year. *Brown*: Not filled well. *Montgomery*: Blasted and rusted. *Chase*: Light weight. *Ellis*: Forty to fifty bushels per acre.

NEBRASKA.—*Richardson*: Badly rusted. *Gage*: Injured somewhat by chinchies. *Knox*: Heavy; blown down in places. *Saunders*: Damaged by excessive rains, especially on flat lands. *Wayne*: Damaged by rain.

CALIFORNIA.—*Shasta*: This crop has done better than usual.

BUCKWHEAT.

The only States reporting increased acreage are Massachusetts, 104, and Nebraska, 101. New Hampshire, Connecticut, Maryland, Minnesota, and Kansas report 100. The rest are below average, the lowest being Delaware, which reports 80.

Condition below average, the only States reporting 100 or above being Vermont, 111; New York, 103; Arkansas, 107; Iowa, 102; Nebraska, 104; and New Hampshire, Delaware, and Minnesota, 100.

BARLEY.

Condition not so good as in August, 1877. California reports 98 against 75 last year. The lowest average is reported in Minnesota, 89, and the highest in Connecticut, 105. Kentucky reports 102; Indiana, 103; New Hampshire, Vermont, Rhode Island, Pennsylvania, Tennessee, and Michigan, 100. A few notes from correspondence are given.

NEW YORK.—*Genesee*: Badly injured by Hessian fly and hot weather.

INDIANA.—*Shelby*: Good yield; well saved. *Huntington*: Good.

WISCONSIN.—*Grant*: Will yield well, but is damaged. *Jefferson*: Yield large, but badly discolored by rain and hot weather.

KENTUCKY.—*Russell*: Best barley crop yet.

MICHIGAN.—*Mecosta*: Doing nicely.

INDIANA.—*Franklin*: Grain good, but yield smaller than last year.

MINNESOTA.—*Olmsted*: Damaged by rust and blight. *Redwood*: Mostly harvested before heated term; good crop. *Wadena*: Good yield.

MISSOURI.—*Ripley*: Canada barley a spring crop here; yield, 40 bushels per acre this year.

KANSAS.—*Brown*: Spoiled by rain. *Ellis*: Looks well.

NEBRASKA.—Injured by the cold, wet spring; drilled barley better than broadcast; last year the cases were reversed.

CALIFORNIA.—*Shasta*: Where sown late in winter it has made a good crop.

POTATOES.

The month of July brought great injury to the potato crop in many portions of the country, and most of the States show, as a consequence, a depressed condition compared with the July report. The three more northern New England States, Maryland, Virginia, North Carolina, Alabama, Texas, Tennessee, Kentucky, Michigan, Indiana, and Missouri, show improvement, but all the other States have fallen off. All the States south of Mason and Dixon's Line and the Ohio River, except South Carolina, Louisiana, and West Virginia, report the crop above average, as also do all the States west of the Mississippi River, except Minnesota. Delaware returns a full average, but all the Atlantic States to the northward, together with all the States north of the Ohio River, report a condition below average; California is 4 per cent. above. The vicissitudes of the crop will be partially illustrated by the following notes. The Colorado beetle has demonstrated in some sections, but has ceased to be formidable to the potato-grower.

MAINE.—*Sagadahoc*: In many places nearly destroyed by the Colorado beetle. *Androscoggin*: Feeling the drought very severely.

NEW HAMPSHIRE.—*Rockingham* : Tops turned yellow, and, on high lands, dried up. Generally unpromising.

VERMONT.—*Rutland* : Early Rose matured without rain ; small and few in the hill. Later planted and later varieties green and growing. *Grand Isle* : Injured by drought and Colorado beetle. *Orleans* : No rust or rot ; but rain needed.

CONNECTICUT.—*Hartford* : Did not come up well. Plant sickly and Colorado beetles out in full force.

NEW YORK.—*Washington* : Too dry in July. Early crop the lightest ever grown here. *Allegany* : Seem to be struck with rust. *Montgomery* : Not more than half a crop. After several weeks' war, farmers have surrendered to the Colorado beetle. *Suffolk* : Damaged by late frosts.

NEW JERSEY.—*Burlington* : Quality and yield very good. *Atlantic* : Prospect very flattering. Early potatoes good.

PENNSYLVANIA.—*Bedford* : Suffered from rain. Early varieties short of an average. *Wayne* : Almost an entire failure, owing to late spring frosts and Colorado beetle. *Northampton* : Promise of fair crop. *Butler* : Early crop small ; late crop promising. *Cambria* : Not promising ; tops dying. *Elk* : Poor on account of excessive rain. Beetles not bad. *Lehigh* : Early crop stunted by frost and beetles. *York* : Injured by drought. *Lycoming* : Early crop good ; late, light, and tops dying prematurely.

MARYLAND.—*Prince George's* : Prospect not promising. Recent drought killed many of the plants. *Harford* : Yield very fine, but rot has appeared in some places.

VIRGINIA.—*Fairfax* : Late crop needs rain ; early crop abundant. *Henrico* : Quality fine, and largest crop ever grown. *Northampton* : Quantity will be small ; farmers afraid of the beetle. *Orange* : Unusually fine, both in quantity and quality. *Prince William* : Came up badly ; prospect poor. *Amelia* : Will be shortened by drought. *Elizabeth City* : Early, fine ; late, backward. *Dinwiddie* : Best crop ever raised. *Madison* : Large, and of good quality ; beetle seems to have disappeared. *Fluvanna* : Exceedingly good.

NORTH CAROLINA.—*Columbus* : Early and late never better. *Beaufort* : Finest crop for many years. *Alamance* : Fine crop. *Gates* : Very good.

SOUTH CAROLINA.—*Clarendon* : Yield heavy and quality good.

GEORGIA.—*Pike* : Beauty of Hebron two weeks earlier than any other variety ; potatoes as large as a hen egg six weeks from day of planting ; the Vermont and Rose rotted badly. *Jackson* : Not promising.

ALABAMA.—*Chambers* : Not largely grown. *Baldwin* : Most abundant yield for years. *Bullock* : Has rarely been better.

MISSISSIPPI.—*Holmes* : Looking well.

ARKANSAS.—*Garland* : Late crop rotting ; early good. *Pope* : Sweet potatoes injured by dry weather.

TENNESSEE.—*Blount* : Early good ; late improving ; a very poor stand. *Loudon* : Suffering for rain.

WEST VIRGINIA.—*Jefferson* : Suffered very little from the Colorado beetle. *Summers* : Affected with rot. *Braxton* : Very promising, especially early planted.

KENTUCKY.—*Nicholas* : A fine crop.

OHIO.—*Ross* : Drought shortened late planting. *Morrow* : Early doing well. *Hardin* : Damaged by heavy rains. *Perry* : Made a good stand but were subsequently injured by beetles. *Adams* : Early crop did well ; late not so promising. *Noble* : Too dry. *Holmes* : Late, but promising. *Lorain* : Crop declined during July ; Colorado beetles destructive. *Meigs* : Late plantings injured by drought.

INDIANA.—*Whitley* : Doing well. *Dearborn* : Early planted good ; late suffering.

ILLINOIS.—*Clarke* : Suffered from top drought and bugs. *Montgomery* : Early did well ; late a failure. *Ogle* : Plenty, but show signs of rotting. *Edwards* : Late and early doing well.

MICHIGAN.—*Chippewa* : Colorado beetles have just appeared, also the "blister-beetle" in considerable numbers, with but little damage as yet. *Hillsdale* : Colorado beetles not very injurious. *Marquette* : Colorado beetles have not done much damage.

WISCONSIN.—*Dunn*: Colorado beetles very numerous and destructive where Paris green was not freely used. *Green*: Have done wonders.

MINNESOTA.—*Pope*: Good where saved from the beetles. *Redwood*: Small and light, but of excellent quality; beetles on the vines.

IOWA.—*Emmett*: Injured by rain, and, on flat lands, rotting in the ground.

MISSOURI.—*Newton*: Doing well. *Macon*: Remarkably fine. *Cass*: Extra. *Caldwell*: Early rose best crop for years. *Adair*: Early crop dried and eaten up.

KANSAS.—*Johnson*: Affected by drought. *Saline*: Fully 20 per cent. better than last year. *Cherokee*: Excellent; large crop planted. *Montgomery*: Badly damaged by wet; seed rotted in the ground, especially late varieties.

NEBRASKA.—*Nemaha*: Tendency to rot in the ground.

CALIFORNIA.—*Siskiyou*: Did well with irrigation.

SWEET POTATOES.

This crop is full average or above in Delaware, South Carolina, all the Gulf States, Kansas, and Nebraska; in all the others it is below 100, though the deficiency does not in any case exceed 5 per cent. Compared with the condition of August, 1877, the Middle States, Maryland, North Carolina, West Virginia, and Kentucky show a decline, but all the Southern States report an improved condition. Of the States north of the Ohio, and of those west of the Mississippi River, Illinois, Kansas, and Nebraska are in higher condition than last year; all the other States indicate a falling off.

TOBACCO.

The twelve largest tobacco-growing States report the following averages of condition of the tobacco crop in August, viz: Kentucky 80, a falling off during July of 13; Virginia 80, a loss of 13; Missouri 95, a loss of 6; Tennessee 85, a loss of 4; Maryland 87, a loss of 15; Pennsylvania 85, a loss of 15; North Carolina 84, a loss of 10; Ohio 96, a loss of 9; Indiana 75, a loss of 17; Connecticut 105, a gain of 5; Illinois 88, a loss of 5; Massachusetts 105, a gain of 4. From the above it will be seen that the tobacco field of the Connecticut Valley is the only one that shows improvement during July. In all other parts of the great tobacco field the crop has fallen off in average condition. As these States represent 95 per cent. of the tobacco culture of the country, their average condition, which is less than 80, may be taken as decisive as to the general yield. The present aspects of the crop indicate a greatly reduced product, even upon the small acreage of 1878. The following notes will give some of the local aspects of the crop:

MARYLAND.—*Prince George's*: Planted early, but on account of drought matured too rapidly. Crop will not be a heavy one. *Calvert*: Below average on account of drought.

VIRGINIA.—*Halifax*: Season unpropitious. Plants dwarfed by cold and drought, and have a tendency to bloom low and have small narrow leaves. *Mecklenburg*: Affected by severe drought. *Amelia*: Acreage small; crop injured by drought. *Campbell*: Looks badly. Dry weather caused it to grow up narrow and button. *Dinwiddie*: Early planted running up small; late planted just beginning to grow. *Madison*: Very little planted, but large and looking well. *Fluvanna*: Only tolerable; "plants scarce."

NORTH CAROLINA.—*Stokes*: Seriously injured by drought. *Caswell*: It is the staple crop of the county. Materially injured by drought. *Granville*: Our chief staple, but very unpromising.

TENNESSEE.—*Smith*: Not half a crop planted, and that doing no good. *Grainger*: But little planted; looks well. *Montgomery*: Grows very unevenly. Some plants scarcely larger than when planted; others in top.

WEST VIRGINIA.—*Doddridge*: Owing to the exactions of severe laws our planters have mostly restricted production to their own necessities.

KENTUCKY.—*Logan*: Greatly reduced by inferior plants, ravages of the fly, and excessive rains in June. *Crittenden*: Poorest crop in many years. County will not raise over 500,000 pounds against a census crop of 1,950,776 pounds. What was planted is in very poor condition, being badly "frenched," stems generally slender and leaves small and erect; does not spread well. *Daviess*: But half of last year's acreage planted and the crop injured by heat and drought. *Hart*: The crop will be only about 50 per cent. of last year's aggregate. In 1876, by the auditor's report, 2,629,148 pounds were produced; in 1877, 1,634,371 pounds. *Cumberland*: But little tobacco planted and that very "sorry." *Graves*: Damaged by excessive rains, much of it "frenched," and not half a crop will be made. *Russell*: Almost a failure.

OHIO.—*Preble*: Unprecedented growth in July. Condition splendid. *Noble*: Injured by drought; poor season for planting. *Montgomery*: Improved by late rains.

ILLINOIS.—*Pope*: Cultivation largely discontinued on account of low prices. *Edwards*: Doing well.

MISSOURI.—*Randolph*: Backward and neglected on account of price. *Chariton*: Excellent, but acreage reduced one-half.

HAY AND PASTURES.

The summer of 1878 has supplied in great abundance both heat and moisture, prime elements in grass production. Hence it is not astonishing to find all of this class of crops in high condition. Timothy hay is above average in all the States except North Carolina, Georgia, and Minnesota. The condition rises to 120 in Rhode Island. Clover is above 100 in all except North Carolina, Ohio, and Indiana, but the deficiency in these States is quite small. The quality of clover hay is below 100 in Vermont, Connecticut, North Carolina, Wisconsin, Minnesota, Iowa, and Nebraska, but in all the other States it is above. Pasture is generally reported as excellent and abundant. In many States the condition of the grass crops, though above average, was lower than the very high figures of July. In spite of local injuries, this branch of culture has been of immense profit to the farmers, and has provided a copious supply of food for domestic animals. The following extracts from our statistical correspondence are appended:

MAINE.—*Sagadahoc*: Fine, and secured in unusually good condition. *Androscoggin*: A very good crop. *Waldo*: Above an average in quality. *York*: Nearly all secured in good condition.

NEW HAMPSHIRE.—*Hillsborough*: First crop an average; second crop promising. *Cheshire*: Crop good, and secured in good condition. *Rockingham*: More than an average, and secured in excellent condition. *Sullivan*: Above average, and harvested in first-rate order.

VERMONT.—*Rutland*: Nearly all secured, and in fine condition.

CONNECTICUT.—*Windham*: One-third above average, and season favorable.

NEW YORK.—*Wyoming*: Clover injured by rains; pasture good. *Genesee*: Timothy very heavy, and mostly secured in fine condition. *Schoharie*: Good crop. *Allegany*: Pasture good, but injured by grasshoppers.

NEW JERSEY.—*Burlington*: Heaviest crop for fifteen years. *Warren*: Heavy crop, and saved in good condition; selling in the field \$8 per ton; lower than for forty years; pasture fine, and in no need of rain.

PENNSYLVANIA.—*Bedford*: Good, and well secured. *Monroe*: The largest crop ever known,

and gathered without rain. *Butler*: Over an average, and well cured; pasture the best for many years. *Elk*: A very good crop. *Sullivan*: Yield better than expected.

VIRGINIA.—*Halifax*: Best crop for years, and saved in fine condition. *Brunswick*: A fine crop of timothy, but not grown to any great extent. *Dinwiddie*: Timothy and clover crop No. 1. *Madison*: Crop large and quality good; pasture excellent. *Middlesex*: Crop never better. *Northumberland*: More timothy and clover saved than in any previous year; pasture suffering for rain. *Loudoun*: Pasture has never been better; has been mowed after being grazed. *Bland*: Pasture cut short by drought. *Orange*: Many grasses luxuriant, but not the best for fattening cattle.

NORTH CAROLINA.—*Nash*: Condition of hay bad on account of dry weather.

GEORGIA.—*Jackson*: Pasture dried up by drought. *Carroll*: Dried up. *Henry*: Pasture has had no chance, but may improve with present rains. *Forsyth*: Injured by drought. *Taylor*: Pasture has failed.

ALABAMA.—*Morgan*: Pasture is failing from drought.

MISSISSIPPI.—*Choctaw*: Timothy and clover played out; an abundance of native grass.

LOUISIANA.—*Madison*: Very fine pasture on account of heavy rains early in July. *Franklin*: Pasture in excellent condition.

TEXAS.—*Dallas*: Native hay very fine; will cut from three to four tons per acre. *Austin*: Late rains have increased the yield of native grasses; timothy and clover not grown. *Fayette*: Only burr clover and goose grass cultivated; the latter very fine. *Washington*: Grass good on prairies; cattle fat and sleek. *Kendall*: Native grasses excellent.

ARKANSAS.—*Columbia*: Natural grasses unusually good. *Stone*: Pasture gave out on account of drought. *Ashley*: Grazing good. *Johnson*: Pasture good.

TENNESSEE.—*Grainger*: Both timothy and clover good and saved in fine condition; pasture very good. *Henry*: Pasture has done remarkably well.

WEST VIRGINIA.—*Jefferson*: Best hay crop for many years. *Morgan*: Pasture injured by drought. *Putnam*: Shortened by long drought. *Mineral*: Green crops unusually abundant. *Braxton*: Timothy and clover both very fine; pasture very good. *Greenbrier*: Grass has continued to grow all season.

KENTUCKY.—*Shelby*: Pasture showing effects of heats and drought; grass growing less nutritious. *Anderson*: Hay crop unusually large and fine. *Nicholas*: Pastures very good; timothy crop fine and well saved. *Gallatin*: Much white-top with other weeds in the meadows. *Cumberland*: Meadow and pasture fine. *Graves*: Hay injured by rain, especially on low lands.

OHIO.—*Ross*: Timothy sod largely broken up for corn or oats, but the season is doing well for the reduced acreage; clover of better quality than last year, but the acreage is reduced; pastures need rain. *Morrow*: Hay crop large and fine, but much clover damaged; pastures never better. *Noble*: Hay and pasture shortened by drought. *Wayne*: Pasture everywhere except on the traveled road. *Portage*: Clover light; bad harvesting weather; other grasses good. *Delaware*: Crops large, but not well saved, on account of the hot, dry weather of July. *Lorain*: Timothy well saved, but clover caught in the rains and somewhat injured. *Mahoning*: Best cured crop of timothy and clover for years. *Meigs*: Pasture shortened by drought.

MICHIGAN.—*Berrien*: Heavy crops of timothy and clover. *Kalamazoo*: Pastures in splendid condition; abundant stock feed. *Clare*: Timothy injured by spring frosts. *Chippewa*: Clover generally mixed with timothy; good crops well saved. *Tuscola*: Hay crop injured by heavy rain-fall. *Ashtabula*: Early-cut clover much injured by rain, but the crop was large and generally well saved; other hay crops good and well secured. Pastures remarkably good all summer.

INDIANA.—*Whitley*: Pastures never did better. *Warren*: Pastures improved by late showers. *Steuben*: Timothy good and well saved. *Marion*: Pastures injured by heat. *Franklin*: Unusual amount of hay cured, but only for feed; prices are too low for sale at profit.

ILLINOIS.—*Pike*: Hay in good condition, but some of it cut overripe; pastures good, though somewhat scorched. *Ford*: Hay all well saved. *Vermillion*: Meadows very heavy; good haying weather. *Boone*: Timothy in fine condition; clover badly injured by frequent

and heavy rains. *Clark*: Hay well saved. *Hamilton*: Hay crop large and excellent; pastures hurt by July drought. *Jefferson*: Grass crop shortened by drought. *Macon*: Hay greatly damaged by wet. *Ogle*: Grass crop good. *Pope*: Timothy shortened. *Putnam*: Timothy and clover never better. *Warren*: Largest hay crop ever cured; many fields of timothy will not be cut; selling at \$4 per ton; fine haying season. *Edwards*: Pasture cut short from drought; timothy good.

WISCONSIN.—*Walworth*: Hay crop enormous; pastures never better. *Waukesha*: Pasture prime. *Green*: Good grass-growing weather.

MINNESOTA.—*Winona*: Bad weather for clover harvest. *Stevens*: No tame hay; wild hay and pasture excellent. *Redwood*: Unprecedented growth of timothy. *Dodge*: Heavy crop of timothy and clover, but hay damaged considerably by wet weather. *Steele*: Hay injured by excessive moisture and heat. *Wright*: Pasture needs dry weather; dairy cows suffering for food.

IOWA.—*Floyd*: Much hay spoiled by rain. *Kossuth*: Great loss of timothy by excessive rains. *Madison*: Great damage to timothy hay by rain. *Marion*: Pastures good. *Howard*: Immense quantities of hay have rotted in the fields. *Jones*: Hay damaged by rain.

MISSOURI.—*Moniteau*: Pastures injured by heat and drought; grass so dried that fire runs through blue-grass just like prairie. *Chariton*: Hay a large yield, well saved; pasture suffered from drought. *Nodaway*: Hay crop heavy but injured by wet. *Caldwell*: Hay, clover, and timothy well saved. *Calloway*: Well-saved hay; pastures burned. *Newton*: Timothy did well; clover not quite so well; too much rain. *Knox*: Injured by drought. *Grundy*: Shortened by drought. *Maries*: Pasture drying up. *Perry*: Pasture shortened by drought.

KANSAS.—*Allen*: Hay and pastures benefited by the wet season. *Brown*: Timothy cut down by rain in harvest. *Ottawa*: Our hay, mostly prairie-grass, well saved; timothy doing well. *Cherokee*: Hay in fine order. *Clay*: Pasture badly damaged by floods leaving sediment.

SORGHUM.

Condition better than at this date last year. Reports very favorable, with a few complaints of drought and deterioration. Our correspondent for Austin, Texas, says: "The yield is heavy, as high as 200 gallons per acre." In Hamilton, Ill.: "So deteriorated, will have to be abandoned as a crop." The highest averages are, South Carolina, 108; Nebraska, 104; Texas, 103; Iowa, 101. All the other States are below 100, the lowest being Georgia, 85.

SUGAR-CANE.

In Louisiana, where this crop is principally grown, the percentage of condition for August is 3 per cent. lower than last year. In most of the other States reporting this crop the condition is better than in August, 1877.

BEANS.

The State averages indicate no material difference from the report of August, 1877.

FRUIT.

The August returns show a general decline in the condition of the various fruit crops. The extreme heat prevailing in all sections during July, together with excessive moisture in some portions of the country, injured both the quantity and the quality of yield, while heavy storms of wind, rain, and hail greatly reduced the stock of fruit left upon the trees and still further injured its

quality. The low condition of the region around Chesapeake Bay is still a marked feature in our returns. Very few insect injuries are noted.

Apples.—The highest promise of this crop still remains in New England, where all the States are above average, and all except Maine show an improved condition. All of the Middle States except Delaware, all of the South Atlantic and Gulf States except Texas, and all the States of the Mississippi Valley except Kentucky, Indiana, and Missouri show a condition below that of July, as also does California.

Peaches.—This crop shows a falling off in condition from the July reports in nearly all the States. The only States that are up to average are, Texas, 106; Tennessee, 109; Illinois, 102; Kansas, 105; and Nebraska, 121.

Grapes.—The hot weather of July was injurious to this crop, as is shown in the depressed averages of nearly all the States. Even the vigorous scuppernong of the South succumbed in many places to an unfavorable season. The only States showing a full average are, Florida, 105; Texas, 112; Tennessee, 102; and Kansas, 100.

Table showing the condition, &c., of crops on the first day of August, 1878.

STATES.	CORN.	SPRING WHEAT.	SPRING RYE.	OATS.	BARLEY.	BUCKWHEAT.		POTATOES.		TOBACCO.
	Average condition August 1.	Average condition August 1.	Average condition August 1.	Average condition August 1.	Average condition August 1.	Average compared with last year.	Average condition August 1.	(<i>Solanum tuberosum</i>) Average condition August 1.	(<i>Batatas edulis</i>) Average condition August 1.	Average condition August 1.
Maine.....	96	96	101	98	97	96	97	98	.....	.....
New Hampshire.....	98	102	102	97	100	99	100	94	.....	.....
Vermont.....	93	97	103	100	100	101	111	91	.....	.....
Massachusetts.....	98	.....	.....	.....	.....	101	96	92	.....	.....
Rhode Island.....	100	100	100	100	100	100	100	98	.....	.....
Connecticut.....	102	103	100	111	100	100	103	75	.....	.....
New York.....	96	95	97	98	95	96	96	84	.....	.....
New Jersey.....	100	97	102	101	100	95	95	95	.....	.....
Pennsylvania.....	86	97	102	99	100	97	94	88	.....	.....
Delaware.....	95	.....	.....	70	100	100	100	100	.....	.....
Maryland.....	92	.....	.....	90	96	96	92	107	.....	.....
Virginia.....	96	.....	.....	101	100	96	92	100	.....	.....
North Carolina.....	84	.....	.....	96	100	100	92	100	.....	.....
South Carolina.....	103	.....	.....	100	100	100	100	100	.....	.....
Georgia.....	97	.....	.....	96	96	96	100	100	.....	.....
Florida.....	99	.....	.....	97	99	100	100	100	.....	.....
Alabama.....	103	.....	.....	101	100	100	100	100	.....	.....
Mississippi.....	102	.....	.....	97	97	100	100	100	.....	.....
Louisiana.....	113	97	103	96	90	100	100	100	.....	.....
Texas.....	104	.....	.....	98	100	95	107	100	.....	.....
Arkansas.....	95	.....	.....	113	100	95	100	100	.....	.....
Tennessee.....	84	.....	.....	102	100	97	97	100	.....	.....
West Virginia.....	95	.....	.....	110	100	96	99	105	.....	.....
Kentucky.....	94	.....	.....	105	100	96	97	93	.....	.....
Ohio.....	95	.....	.....	99	97	96	99	99	.....	.....
Michigan.....	93	95	97	105	103	95	95	95	.....	.....
Indiana.....	87	.....	.....	105	95	95	98	95	.....	.....
Illinois.....	94	.....	98	105	95	95	98	95	.....	.....
Wisconsin.....	96	91	100	96	90	96	100	92	.....	.....
Minnesota.....	102	92	104	90	86	96	100	99	.....	.....
Iowa.....	103	90	100	97	93	88	102	101	.....	.....
Missouri.....	95	96	95	97	97	93	97	105	.....	.....
Kansas.....	107	72	95	106	95	100	100	112	.....	.....
Nebraska.....	116	97	98	92	98	101	104	110	.....	.....
California.....	100	92	92	78	95	101	104	101	.....	.....
Oregon.....	.....	.....	92	.....	98	.....	.....	.....	.....	.....

Table showing the condition, &c., of crops on the first day of August, 1878—Continued.

STATES.	HAY.			PASTURE.	BEANS.	COTTON.		SUGAR-CANE.	APPLES.	PEACHES.	GRAPES.
	Average condition of timothy August 1.	Product of clover compared with last year.	Average quality of clover hay compared with last year.		Average condition August 1.	Average condition August 1.	Average condition August 1.				
Maine.....	104	100	101	101	102	.....	.....	.....	101	.....	.....
New Hampshire.....	105	99	101	104	103	.....	.....	.....	108	.....	.....
Vermont.....	101	103	95	100	96	.....	.....	.....	125	.....	.....
Massachusetts.....	103	104	100	102	96	.....	.....	.....	114	.....	.....
Rhode Island.....	130	.....	115	85	.....	.....	.....	.....	.....	.....	.....
Connecticut.....	173	105	85	105	100	.....	.....	.....	82	.....	.....
New York.....	103	102	101	102	97	.....	.....	.....	60	.....	.....
New Jersey.....	103	113	102	111	96	.....	.....	.....	71	.....	.....
Pennsylvania.....	101	106	100	100	97	.....	.....	.....	60	.....	.....
Delaware.....	105	115	100	105	87	.....	.....	.....	65	.....	.....
Maryland.....	108	109	103	103	94	.....	.....	.....	71	.....	.....
Virginia.....	93	98	99	90	89	.....	.....	.....	69	.....	.....
North Carolina.....	103	103	99	99	82	.....	.....	.....	92	.....	.....
South Carolina.....	91	103	88	104	82	.....	.....	.....	82	.....	.....
Georgia.....	.....	.....	.....	.....	99	.....	.....	.....	94	.....	.....
Florida.....	.....	125	102	105	91	.....	.....	.....	92	.....	.....
Alabama.....	.....	124	106	109	105	.....	.....	.....	98	.....	.....
Mississippi.....	.....	.....	.....	108	105	.....	.....	.....	84	.....	.....
Louisiana.....	.....	.....	.....	112	104	.....	.....	.....	105	.....	.....
Texas.....	109	104	101	110	99	.....	.....	.....	73	.....	.....
Arkansas.....	107	109	102	102	95	.....	.....	.....	83	.....	.....
Tennessee.....	105	104	103	99	97	.....	.....	.....	88	.....	.....
West Virginia.....	104	106	102	104	91	.....	.....	.....	90	.....	.....
Kentucky.....	102	100	99	102	92	.....	.....	.....	105	.....	.....
Ohio.....	102	103	100	101	97	.....	.....	.....	88	.....	.....
Michigan.....	100	103	100	103	97	.....	.....	.....	95	.....	.....
Indiana.....	104	105	103	100	97	.....	.....	.....	74	.....	.....
Illinois.....	106	105	103	100	100	.....	.....	.....	85	.....	.....
Wisconsin.....	102	115	94	105	100	.....	.....	.....	64	.....	.....
Minnesota.....	95	107	70	111	105	.....	.....	.....	62	.....	.....
Iowa.....	102	108	92	108	99	.....	.....	.....	66	.....	.....
Missouri.....	105	108	104	94	99	.....	.....	.....	63	.....	.....
Kansas.....	107	116	101	107	97	.....	.....	.....	85	.....	.....
Nebraska.....	112	117	95	117	101	.....	.....	.....	92	.....	.....
California.....	103	125	108	109	98	.....	.....	.....	94	.....	.....
Oregon.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....

ENTOMOLOGICAL NOTES.

Since the date of our August returns. Professor Riley, the Entomologist of the Department, has received information regarding cotton-insects from special observers and agents employed by the Department. A few extracts follow :

Mr. A. R. GROTE writes from Atlanta, Ga., August 11 :

The worm is not here, although I hear of it in Southwestern Georgia. There seems to be a belt of country within the sea-coast line where it is only occasional. The statements I shall bring with me to Saint Louis will bear on the subject. I shall be here again before leaving for Saint Louis, and shall forward you the vouchers and statement to Washington.

Mr. J. H. COMSTOCK writes from Marion Junction, Alabama, July 30 :

The cotton crop is looking fine here. The boll-worm is doing some injury, but the army-worm has not yet appeared at this place, although it is said to be at Macon, thirty miles west of here. Every planter with whom I have conversed on the manner of the first appearance of the army-worm says that in each locality the worms first appear on a certain plantation, and on very limited part of the plantation. Mr. B. J. Fort pointed out to me a small piece of ground comprising only a few square rods, in the midst of a large cotton plantation, on which the worms have appeared year after year three weeks earlier than on the remainder of the plantation. This year he has planted that part in corn "to break the worms up."

I examined this place carefully but found no local peculiarities. In general, the worms are said to appear on those parts of the field where the cotton is most thrifty ; but in this particular case Mr. Fort informs me that the cotton did not grow as thrifty as on some other parts of the field where the first brood of worms could not be found.

The majority of the planters feel sure that the army-worm winters here, either as a chrysalis or a moth. They plow up the chrysalis [evidently a mistake, the species transforms above ground. C. V. R.], and find the moths in hollow trees and about negro cabins in the winter time. (I doubt from what I have seen if one planter in ten knows the difference between the army-worm moth and that of the boll-worm.) If they are right, it is evident that the greater part of these insects die during the winter, as the spring broods are very small. Now, are these places of which I have been writing better fitted for the preservation of the army-worm during the winter, or is the cotton which grows upon these places such that the moth prefers to overposit upon to overpositing upon that which grows elsewhere ? It is a very puzzling matter. I suspect the planters exaggerate the regularity of the appearance of the worms in these localities. I propose to investigate this point carefully.

Mr. COMSTOCK further writes, from Selma, Ala., August 10 :

Some of the plantations where I have been, in the vicinity of Macon Station, are very badly infested by the army-worm. In one place nearly fifty acres of cotton was destroyed, at least four-fifths of the foliage being eaten. Just at this time very few worms are eating, the majority being in the pupa state. This is the second of the three "crops" of which the planters speak. Already the moths are appearing in considerable numbers ; and probably by the time I return from Huntsville the last brood of worms will be at work. Judging from the number of pupæ to be found now, the new brood, when it comes, will sweep that part of the country.

DEPARTMENT OF AGRICULTURE.

SPECIAL REPORT—No. 8.

REPORT

UPON THE

CONDITION OF CROPS

SEPTEMBER 1, 1878.



WASHINGTON
GOVERNMENT PRINTING OFFICE.
1878.

SEPTEMBER REPORT OF GROWING CROPS.

COTTON.

Our September returns show a general average condition of 90 in the cotton crop against 95 in August and 99 in June and July. The decline in monthly condition does not greatly differ from that of last year, and the average of September is 4 higher than in 1877. The State averages are as follows: North Carolina, 86; South Carolina, 80; Georgia, 81; Florida, 91; Alabama, 92; Mississippi, 89; Louisiana, 83; Texas, 101; Arkansas, 98; Tennessee, 91.

The pestilence prevailing in the Lower Mississippi Valley has restricted the number of our reports from that State somewhat, reducing the number of counties reporting cotton from 299 in August to 271 in September, classified as follows:

STATES.	Counties reporting—			Total.
	100.	Above 100.	Below 100.	
North Carolina.....	11	3	19	33
South Carolina.....	0	1	14	15
Georgia.....	8	7	50	65
Florida.....	3	3	9	15
Alabama.....	7	5	9	21
Mississippi.....	5	7	13	25
Louisiana.....	3	0	6	9
Texas.....	9	19	15	43
Arkansas.....	10	5	12	27
Tennessee.....	3	3	12	18
Total.....	59	53	159	271

The average condition of the crop in these States at the beginning of the first four months of the present and the previous growing seasons are shown by the following table:

STATES.	June.		July.		August.		September.	
	1877.	1878.	1877.	1878.	1877.	1878.	1877.	1878.
North Carolina.....	80	87	88	81	88	82	83	86
South Carolina.....	91	99	87	104	88	97	84	80
Georgia.....	101	101	90	105	85	92	77	81
Florida.....	92	98	95	100	93	99	94	91
Alabama.....	90	100	94	102	94	98	91	92
Mississippi.....	91	98	93	98	90	92	88	89
Louisiana.....	91	98	93	95	106	90	92	83
Texas.....	91	104	94	106	96	108	70	101
Arkansas.....	94	98	94	91	93	98	99	98
Tennessee.....	94	97	96	98	90	92	100	91
General average.....	93	99	93	99	93	95	86	90

Compared with 1877, the September condition is 4 higher in the whole cotton belt, and shows improvement in North Carolina, Georgia, Alabama, Mississippi, and Texas; the other States report a lower condition. The following table shows the September condition of the last nine growth seasons:

STATES.	1870.	1871.	1872.	1873.	1874.	1875.	1876.	1877.	1878.
North Carolina	105	80	101	95	87	90	93	83	86
South Carolina	105	75	95	86	86	80	91	84	80
Georgia	105	72	96	90	77	76	90	77	81
Florida	105	73	92	85	77	75	83	91	91
Alabama	100	75	88	85	81	87	83	91	92
Mississippi	100	76	90	82	74	98	87	88	89
Louisiana	108	73	86	80	62	88	90	92	83
Texas	109	70	94	92	65	94	87	70	101
Arkansas	110	82	78	93	47	96	97	99	95
Tennessee	100	84	92	92	52	96	119	100	91
General average	105.7	82.3	91.2	88	70.4	88.3	92.3	86	90

In the eastern cotton States bordering on the Atlantic the leading complaints are of unfavorable atmospheric conditions. In North Carolina these were better than in July, and hence the State average is increased by 4. South Carolina and Georgia, however, report a serious decline, the former of 17 and the latter of 11. In some counties the extreme heat of July was protracted into August, and in others excessive rains have produced rust, blight, and rot. In the southwestern counties of Georgia the army-worm (*Aletia argillacea*) did some local injury, and a few are noted east of the Ocmulgee River, but this region was comparatively free from this pest.

All the Gulf States show a decline, complaining of the same atmospheric disturbances as in the Atlantic cotton States, together with a more general development of insect enemies to the crop. The army-worm was very destructive in several counties, especially in the cane-brake region of Alabama, as is shown in the accompanying notes on cotton insects, compiled from the reports of Professor Riley. The boll-worm in several sections did more damage than the army-worm. In Marshall, Miss., the borer was also present in the cotton crop, impairing its vitality. On the other hand, in some cases the luxuriant growth of the crops rendered the visitation of insects rather welcome than otherwise, as reducing the foliage and giving the bolls a better opportunity to develop.

Of the two inland cotton States, Arkansas maintains her August average, while Tennessee declines 1. The same climatic conditions as in the other sections of the cotton field here vary the promise of the crop, but operate, on the whole, less severely. At several points in the Arkansas Valley insect injuries are noted, but in no case are they very serious.

The prospect of the crop, on the whole, is unusually favorable. It has passed its critical period, and still shows high vitality to meet the vicissitudes of autumn. The decline in condition is not greater than usual; it was scarce to be expected that the condition would improve in August. The final outturn, however, is still a matter of speculation, dependent upon many contingencies. If the season of growth and gathering should be as prolonged as last year, the

yield will be greatly increased, equaling if not exceeding the great ante-bellum crops.

The following extracts from correspondence are given:

NORTH CAROLINA.—*Columbus*: Since the rains cotton has rusted to a ruinous extent on some farms. *Pamlico*: Excessive rains have damaged the crop. *Union*: Fine improving rains. *Nash*: Late rains and warm weather have caused a large weed, which is fruiting well. *Wilson*: Much improvement during the past month. *Beaufort*: Cotton improved wonderfully; but heavy rains continued too long, retarding opening; picking will not commence before September 1. *Camden*: Rusting, but well fruited. *Cumberland*: Not more than half a crop. *Greene*: Too much rain has caused rust, which is spreading rapidly, and will cause all the top bolls to drop, and shorten crop. *Duplin*: Badly injured by rains, causing rust and shedding of forms; should unfavorable weather continue, only half a crop can be realized. *Hyde*: Excessive rains have greatly damaged the cotton, by causing it to shed forms. *Orange*: Injured by rains.

SOUTH CAROLINA.—*Barnwell*: The top crop will be lost, while the middle crop will be heavier than the early or bottom crop. *Clarendon*: I have never known so fine a crop so seriously injured by rust and, in some cases, blight; I have traveled pretty much over the country and find it general. *Fairfield*: A great change has come over the prospects of cotton; within the last ten days rust has appeared on all late cotton to an extent scarcely ever before known in this section. *Newberry*: Much injured by rust on sandy lands. *Union*: Prospect less favorable—rust. *Marion*: Cut off by hot, dry weather; should fall prove favorable (not too wet), crop will be twenty days earlier than usual. *Richland*: Seriously injured by rains, the opening staple being beat out and washed in the dirt; the extra growth caused by rains has rotted in the lower bolls, and needs sun and dry weather. *Williamsburg*: Injured by rains; plant in many fields leafless. *Laurens*: Cotton has taken a second growth, and is running too much to weed; fourteen days earlier than any year since 1856; first bale marketed last week in August. *Orangeburg*: Injured by drought.

GEORGIA.—*Coveta*: Commenced to open very early. Fodder-pulling and the very hot weather prevented picking, and consequently it has been much damaged by rains. *Baker*: Badly damaged by rust. Caterpillars are injuring the late cotton. Rust and rain have done the most damage. *Elbert*: Rains have improved the crop. *Gwinnett*: Has recuperated in the hail districts, and with favorable season for maturing will be better than that not "hail-struck," as it has suffered less from the drought. *Henry*: The six weeks' drought has cut off the crop. *Jasper*: Early crop suffered from drought and excessive hot weather, and cast much of its fruit. Late doing well. *Jones*: Early-planted and highly-guanoed cotton greatly injured by dry weather; the late-planted and that which had no guano is doing well; late rains now give it the promise of making the best crop. *Laurens*: The hot weather of July caused rust and, with the wet weather of August, cotton is in a bad condition. *Lincoln*: No general rains since 9th of June, none in July and up to August 13. Where guano was not used, the crop is the best. Lands that ordinarily produce a bale to two acres will not more than make one to five or six. Few instances where the crop is up to an average. *McDuffie*: Excessive heat of July continued up to August 10, causing much loss of fruit, too late to make a top crop. My assistants reduce the crop one-half, which is rather below the mark, although it is the poorest crop since 1866. *Sumter*: Doing well. *Thomas*: Too much rain, causing loss of bolls and rust; some caterpillars; opening fast and planters housing as fast as they can; it is early for so much open cotton. *Troup*: Plant large for this climate and promises well. *Warren*: A failure; will require 10 acres to make a bale in some portions of the county; opening rapidly, and, with favorable season, the bulk of the crop will be gathered by October 1. *Worth*: Badly damaged by rust. Fruit rotting from excessive rains. *Berrien*: Rust has caused great loss of fruit. *Dooly*: Badly rusted; no top crop; stalks dead; unprecedented destruction by rust; three-fourths of crop will be housed by first of October. *Dodge*: Injured greatly by rust, drought, and a few caterpillars; two or three weeks earlier than any year since the war. *Richmond*: All the fruit formed since August 15 has fallen off, and many fields which appeared 10 per cent. above average, as regards size

of plants and luxuriant growth, have now scarcely a boll which is not open. *Hall*: Prospects never better. *Clayton*: Cut off by drought and hot weather. *Jefferson*: Seriously injured by scorching days and withering nights. *Hart*: In dry localities cotton small, but very heavily fruited. *Putnam*: Suffering from wet weather; bolls and lint rotting; samples received. *Wilkes*: The weed, where all but bolls have shed off, is making wood rapidly, and to the disadvantage of bolls. What the new growth will make depends entirely on frost. *Calhoun*: Lack of pickers. *Crawford*: Difficult to estimate; most of the crop was planted early, but the later is doing best now; much complaint of rust. *Lee*: Some caterpillars, but no damage. Early planted manured cotton done. *Pulaski*: Cotton has made nothing since 1st of August, except late and unfertilized crops. *Early*: More cotton has gone to market in August than ever known before; much is open and sprouting for want of pickers, through sickness and indisposition to work for what are called low wages; this, with worms and rust, will cut off the crop at least 15 per cent. *Carroll*: Failure—rust and drought.

FLORIDA.—*Gadsden*: Rust since August 1; caterpillar and boll-worm have also reduced the figures very much; will fall still lower in September from present appearances. *Marion*: Visited by caterpillars, but the weed was too forward for much damage; crop opening rapidly, and lint of good quality. *Leon*: Prospects better one month ago than now; rust and caterpillar in some sections. *Suwannee*: Heat has caused shedding and rust. *Columbia*: Caterpillars present, but too late to do much damage. *Jefferson*: Up to the last of July there was a flattering prospect for cotton, but the intense hot weather, together with heavy beating rain-storms in some sections, and drought in others, caused shedding of almost the entire middle crop; three-fourths has since put on a second growth; caterpillars on the increase, eating out in some places, webbing up in others; apprehensions are felt that they will so increase as to destroy the crop.

ALABAMA.—*Barbour*: Too much rain in some parts of county and too dry in others, and rust on light, sandy lands; fully one-third short of August condition; caterpillar has appeared on the bottom lands and will probably destroy all the late crop. *Chambers*: Considerably injured by extreme heat in August. *Clarke*: Prospects good. *Crenshaw*: Fallen off owing to rust; in the first appearance of rust the top side of the leaves appears to be coated with honey-dew and the under side to be coated with small insects resembling lice; the leaves then assume a red appearance, and the stalks commence to die; the cotton-boll commences to mature, the lint is inferior in quality, and the seed small and light. *Macon*: Worms have appeared in some sections, and the crop will probably be cut off to some extent. *De Kalb*: It will require some time to develop the effect of the late rains on the crop. *Coffee*: Rust reported in many places throughout the county. *Jefferson*: Worms in some portions of the county. *Hale*: Caterpillar is in full blast; will finish the cotton in a few days; the chances to make a crop have fallen off about 20 per cent. since August. *Bullock*: Heavy rains have cut down the crop; caterpillars have been busy in prairie-lands, but will not materially affect the yield; weed large and well fruited; the loss of its leaves will let in the sun's rays and stop the rotting of the bolls; this will be more of a benefit than an injury.

MISSISSIPPI.—*Marshall*: Cotton has suffered from the borer-worm; opening freely, with good staple. *Noxubee*: Picking commenced; boll-worm has caused some damage—at least 10 per cent. *Yazoo*: Season unusual for cotton, three weeks to a month in advance; early planted did well; later planting badly, owing to wet weather; from July 15 to August 15 weather dry and hot, causing much shedding of forms. *La Fayette*: Notwithstanding the heavy rains of the first half of August, cotton promises an abundant yield; a few planters have commenced picking. *Lauderdale*: Early cotton injured by drought during the first half of August, but prospects are promising. *Kemper*: Suffering from too much rain, otherwise would be an average crop. *Lowndes*: Weather very unfavorable; damage from boll-worms and shedding of young fruit; prospect is discouraging. *Monroe*: At one time too dry, now too wet; uplands greatly damaged by the drought and bottoms by the worm; picking will be late, as there is much sickness among the hands. *Clarke*: Turning out far better than was expected on August 1; top crop better than for several years; early frost might cut the crop short of present prospects. *Covington*: Injured some by drought. *Lee*: Boll-worm present, but not injurious as yet. *Jefferson*: Poor; large stalk, little fruit, and much rust; wettest season

in twenty-eight years; plenty of worms. *Rankin*: Poorest crop in eight years; worms destructive in some fields; shedding excessive and general; picking began August 15, and is progressing slowly. *Smith*: Boll-worm doing much damage.

LOUISIANA.—*La Fayette*: Picking has commenced; weather favorable and yield promising; signs of the caterpillar, but no fears of much damage. *Concordia*: Opening very fast, and at least three weeks in advance of last year; good pickers find no trouble getting 300 pounds clean cotton; quality very superior; we pay 50 cents per 100 pounds for picking, the pickers finding themselves. *Madison*: Too much rain caused the bolls and young forms to throw off; caterpillars present, but have done no harm as yet; extra pickers cannot be got, on account of the yellow fever. *Caddo*: Shedding and boll-worm destroyed at least half the crop in August; caterpillar now in full force and destructive.

TEXAS.—*Bell*: Cotton promising; will make from one-half to two-thirds of a bale per acre. *Cherokee*: The boll-worm has caused great destruction of bolls; many stalks without a single boll, and many others with only two or three. One month ago a 60-acre field bid fair to yield 40 bales; to-day it will not make 15; not so bad on bottom lands as on uplands. *Colorado*: Cotton-worms injurious. *Dallas*: Good, but damaged some by boll-worm, something very unusual for this section; as it is late, we hope the damage will be light; staple good; picking has commenced. *Medina*: Looks well, and will yield three-fourths of a bale per acre. *Polk*: Worms have made their appearance, but too late to do damage; prospects good. *Rockwall*: Wet weather has injured the crop. *Rusk*: Boll-worms, but no caterpillars; crop opening rapidly and some already in market; staple good. *Upshur*: In some localities fruit nearly destroyed by boll-worms. *Victoria*: Stripped of leaves and bolls by worms, which, coming late, have done less damage than usual; average height of weed, 7 feet. *Williamson*: Promises well; picking commenced three weeks earlier than last year. *Wood*: Nearly all the middle crop destroyed by boll-worms. *Collin*: Late, but will make a fair crop. *Bosque*: Two months' drought has cut the crop down at least one-fourth. *Burleson*: Farmers are very forward in cotton picking. *Burnet*: Suffered from drought. *Waller*: Cotton on some of the bottom and up lands too luxuriant in growth; the army-worm would be a great benefit now to many bottom farmers, by exposing the bolls to the sun; army-worm is present, but moves slowly in its destruction of the leaves. *Austin*: Cotton-worm all over county in spots; some fields stripped bare; the second brood having hatched, will render a top crop impossible; the yield, however, will be much larger than last year and the staple of a much better quality. *Atascosa*: No caterpillar as yet; something uncommon. *Bastrop*: Doing well; no worms; picking progressing finely; crop larger by far than for years. *McLennan*: After a great deal of pains to learn the status of the cotton crop in this county, I give the figures as 66; two weeks earlier than usual, the drought having caused it to open very fast. With no unforeseen occurrence, nine-tenths of crop will be ready for market by the 1st of November. *Madison*: Being rapidly gathered and carried to market; if weather continues favorable, the yield will exceed any crop since the war. *Matagorda*: Much injured, and what was the best prospect since 1875 is now greatly reduced by rot and loss of forms; caterpillars began to eat about the middle of August, and have destroyed much cotton. *Washington*: Boll and cotton worms have appeared in nearly every neighborhood, and will cut crop at least 20 per cent. short compared to report of August. The most of the early cotton is so large and such rank growth that the worm can do it little harm, but the late planted will suffer; the boll-worm causes squares to shed and the young fruit to drop off.

ARKANSAS.—*Fulton*: Recent favorable weather has improved cotton very much. *Garland*: Squares dropping. *Grant*: Injured by drought. *Union*: Damaged by boll-worm; season two weeks earlier than usual. *Izard*: Weather favorable and prospects brightening. *Ashley*: No worms yet; fine rains. *Johnson*: Weather favorable and weed very large. *Stone*: Late rains have improved the cotton wonderfully. *Crawford*: Cotton-worm has appeared and threatens very much injury to late planted crops; the larger portion, however, is out of danger. *Franklin*: Considerable complaint of the boll-worm. *Pope*: Bolling well and some boll-worms present.

TENNESSEE.—*Lincoln*: Suffering from drought. *Decatur*: Too much rain for the cotton crop. *Lauderdale*: Would have been fine but for the rust.

COTTON INSECTS.

Prof. C. V. Riley, entomologist of the department, is now on a tour through the cotton States investigating the operations of the different insects which usually infest the cotton crop during its growing season. He is assisted by Prof. J. H. Comstock, professor of entomology in Cornell University, and by Prof. A. R. Grote, another distinguished entomologist who has paid special attention to cotton insects. These scientists have divided the whole Southern cotton-field between them, and, with the assistance of several able local observers, have been industriously pushing their operations. Unfortunately for the investigation, but fortunately for the planters, cotton insects so far have been developed to a very small extent, and the facts to be gathered are so isolated and scattered as to necessitate great labor in gathering them. The prevailing epidemic in the South, the yellow fever, has also retarded their investigation, even in places in which there is no possible danger of its occurrence. The panic among planters and laborers has superseded even the chronic anxiety caused by the insect enemies of the cotton crop, and hence the observations of cultivators are very limited and unsatisfactory. Local correspondence is also difficult, and hence the operations of these gentlemen have been greatly embarrassed.

As the eastern portion of the cotton-field has been measurably free from this pest, Professor Comstock's observations are confined to the State of Alabama, and mostly to that fertile cotton region known as the "Cane-brake," and traversed by the Alabama Central Railroad. He reports that the "cotton-worm" (*Aletia argillacea*) made a very late appearance this season, none being observed in the Cane-brake till the middle of July. It is noted, as a special peculiarity of the season, that the second brood of these worms, contrary to previous observations, was unusually large in a few limited localities, nearly stripping the cotton of its foliage, whereas in previous seasons this brood has not been regarded as very formidable. In Marengo, Perry, and Hale Counties the second brood webbed up between the 4th and 6th of August, and appeared as moths between the 14th and 16th. In Dallas, just east of Marengo, they webbed up about a week later, but by the first week in September the third brood was very destructive in all these counties to crops that had not been well poisoned. It is remarkable that cotton on poor soil and considerably blighted or rusted escaped their ravages.

Professor Grote reports having made a reconnaissance through Eastern Georgia, paying special attention to the migrations of the moth (*Aletia argillacea*). From very numerous personal observations and from an extensive interchange of views with intelligent planters in this region he could discover no traces of the visitation of this insect during the season. In fact he is satisfied, from the observations of planters, that the "cotton-worm" visits this region only occasionally. He traversed the counties of Burke, Clarke, Fulton, Greene, Hall, Hancock, Jones, Monroe, Putnam, and Richmond without discovering any traces of the insect. In Jones County the earliest recorded visitation of the worm was August 14, 1873, when the ravages were quite serious in Central and Eastern Georgia. In the western and southwestern parts of the State the

worm puts in a regular annual appearance, especially in the rich, rolling lands between the Chattahoochee and Flint Rivers, where it was first noticed about the end of July. Professor Grote cites the observations of J. G. Hall, esq., of Macon, to the effect that the worm annually invades the State from the southwest, and its line of movement has been traced through Decatur, Baker, Calhoun, Dougherty, and Lee Counties. On the islands off the coast the "worm" is a regular visitor, appearing early in July, as it often does in the cotton belt of Alabama and Mississippi. Professor Grote has gathered historic evidence of the gradual introduction of the "worm" into the United States by way of Florida from the West Indies. The details of this evidence will be given to the public hereafter.

Professor Riley, while taking the oversight of the whole field, has directed special attention to the more southern portions. He notes an unusually late appearance of the "worm" in the Southwest, where it did not show itself in any force till the middle of August, and then only within narrow limits. Some observers in South Texas put the loss occasioned by the insect at a third of the crop, but experience has taught a distrust in local estimates of this character, which are often unduly influenced by panic. A still greater loss is stated in some districts of Alabama, leading to extravagant local estimates of general loss.

Notwithstanding the obstacles thrown in the way of the investigation by the prevailing epidemic, several important and substantial results have been reached. No previous observation of parasites of the cotton-worm had been made, but this season several have been detected. The experience gathered in Alabama is adverse to Professor Grote's theory of the annual introduction of the worm, and in favor of its hibernation in the Cane-brake. The necessity of fuller and more satisfactory observations on the subject and the lack of original facts of undoubted verity from which to form general conclusions are emphatically noted by Professor Riley. The owners of plantations at this season of the year are generally absent at watering-places, and the overseers left in charge "are often so little informed in regard to even the simplest facts of insect life that their opinions and reports are found upon examination to be of little value. Professor Comstock reports a case where a number of persons at Selma, Ala., had gathered around a bonfire and were remarking the large numbers of the 'cotton-fly' that were being attracted thereto and destroyed, whereas in reality the insects thus attracted proved upon examination to be May-flies (*Ephemera*)."

The labors of the investigation have been highly appreciated by the people of the cotton region, and will doubtless be productive of good in provoking a more general and effective study of the facts pertaining to the insect enemies of the cotton-planter. It may be anticipated in future years that the scientist will find better material to work from in the more abundant collections of local facts.

The boll worm was found by Professor Comstock to be very injurious in Central Alabama. "It is the belief of many planters that this species does more injury than the cotton-worm, and there is no doubt that it is a more difficult pest to contend against. Some new and important observations have been made on the habits of this species."

CORN.

The average condition of the corn-crop is 92, against 96 in August and 95 in July. It is still somewhat better than last year, when the September average was 91. The extreme heat of midsummer was, on the whole, not unfavorable to the crop, as is seen in the slight improvement in July. The August conditions of growth, however, were considerably less favorable throughout all the corn region, as is shown by the fall of 4 per cent. in the general average. This decline, however, is not unexpected, as it is in accordance with the analogies of the previous crop. This will be seen in the following comparison of the summer averages of the last three years :

	1876.	1877.	1878.
July	97	85	95
August	100	92	96
September	99	91	92

The crop in the northern portions of the Atlantic slope very nearly held its own. That of the Southern States, as a whole, fell off about 3 per cent. The immense corn region north of the Ohio River, which usually contributes about two-fifths of this crop, shows a slight improvement, while the new corn area west of the Mississippi fell off over 10 per cent. The Pacific slope maintains its August average of 100.

The counties reporting this crop are classified, according to condition, as follows :

States.	Counties averaging 100.	Counties above 100.	Counties below 100.	Total.	States.	Counties averaging 100.	Counties above 100.	Counties below 100.	Total.
Maine	3	5	1	9	Texas	13	31	5	49
New Hampshire	2	2	3	7	Arkansas	7	12	8	27
Vermont	2	1	3	6	Tennessee	8	4	20	32
Massachusetts	3	2	1	6	West Virginia	10	9	12	31
Rhode Island	1			1	Kentucky	3	1	31	35
Connecticut		2		2	Ohio	17	11	27	55
New York	14	7	13	34	Michigan	13	8	10	31
New Jersey	3	2	3	8	Indiana	11	3	20	34
Pennsylvania	4	2	33	39	Illinois	15	4	32	51
Delaware			1	1	Wisconsin	10	12	7	29
Maryland	5	3	5	13	Minnesota	12	17		29
Virginia	15	17	24	56	Iowa	10	24	9	43
North Carolina	11	10	26	49	Missouri	9	12	32	53
South Carolina	7	4	4	15	Kansas	6	9	8	23
Georgia	11	24	36	71	Nebraska	6	12	1	19
Florida	6	5	7	18	California	3	2	1	6
Alabama	5	9	5	19	Oregon	1	1		2
Mississippi	8	9	10	27					
Louisiana	4	7		11	Total	252	278	391	921

The tendency of favorable and unfavorable conditions to arrange themselves in contiguous zones is noticeable in August, as was remarked in our last report in regard to July. Insect injuries were insignificant. Local injuries by storms very little affected the general aggregate. The leading complaints were from drought or excessive rains. As the average varies but slightly from last year, and the condition fully as good, the present prospect is

for a yield of corn fully equal to that of 1877, provided the remaining part of the season is as favorable as last year.

The following are extracts from correspondents :

MAINE.—*Androscoggin* : Doing very well. *Piscataquis* : Severely injured by destructive hail-storm ; general condition very indifferent. *Sagadahoc* : Has done well, being affected less by drought than any other crop in this county.

NEW HAMPSHIRE.—*Cheshire* : Injured by wet weather.

VERMONT.—*Orleans* : Maturing slowly. *Caledonia* : Has improved within the month.

MASSACHUSETTS.—*Berkshire* : Very fine crop ; highest average for seventy years.

NEW YORK.—*Washington* : Season not favorable ; many fields nearly destroyed by large white grub. *Genesee* : Vigorous growth and ears well developed ; crop impaired about 10 per cent. by smut. *Montgomery* : Weather favorable for good crop. *Saratoga* : Much injured by grub.

NEW JERSEY.—*Burlington* : Fine growth and ripening well. *Warren* : About an average crop. *Atlantic* : Has not eared well, but has done well in fodder.

PENNSYLVANIA.—*Blair* : There will be a short crop, owing to continued drought. *Cambria* : Very much affected by drought. *Clearfield* : Crop will be light, on account of continued dry weather. *Beaver* : Injured by dry August weather ; ears poorly filled. *Montgomery* : Owing to the entire absence of rain during July and August, there will be but half a crop. *Perry* : Injured by drought. *Sullivan* : An average crop, in good condition. *Wayne* : Injured by smut in the ear and top of the tassel. *Columbia* : Yield will fall short, owing to drought. *Lawrence* : Will not realize more than half a crop. *Jefferson* : Greatly injured by drought during August. *Indiana* : About half a crop.

MARYLAND.—*Frederick* : Early growth retarded by cold, damp weather ; about half a crop. *Saint Mary's* : Condition improved by recent rains. *Washington* : Owing to cold spring and dry, hot summer the crop will fall below an average. *Calvert* : Below average.

VIRGINIA.—*Dinwiddie* : Much improved by late favorable weather. *Essex* : Drought of July and August has injured early planted ; late crop damaged by cold nights. *Fairfax* : Has improved very much since last report. *Halifax* : Crop shortened by drought. *Loudoun* : Unless affected by early frost will be above average. *Mecklenburg* : Greatly improved by late rains. *Rappahannock* : Much of the crop is late, but very good. *Campbell* : Does not promise well, deficient in grain ; late rains not sufficient to overcome effects of drought. *James City* : Rains of July and August have caused to ear well. *Augusta* : Has not recovered from early effects of drought. *Middlesex* : Considerably damaged by dry weather in July. *Northumberland* : Suffered from protracted drought. *Northampton* : Greatly improved by late rains, but below an average. *Westmoreland* : General condition very much improved by late rains. *Fluvanna* : Has done well.

NORTH CAROLINA.—*Alamance* : Late planted improved by recent rains, but early too far advanced to be benefited. *Chatham* : Condition brought up by rain to full average. *Columbus* : Considerably injured by drought. *Pamlico* : Late planted doing well. *Union* : Greatly improved by late rains. *Wilkes* : Injured by drought. *Wilson* : Below an average ; no improvement since August report. *Beaufort* : Average crop. *Cumberland* : Will not make more than 50 per cent. of a crop. *Davie* : Early crop injured by unfavorable weather. *Greene* : Early greatly impaired by drought ; late planted doing well. *Duplin* : Greatly damaged by heavy and continued rains. *Hyde* : Material damage from excessive wet weather. *Mitchell* : About half a crop ; may be improved by rain ; never knew such a drought. *Orange* : Very much improved by late rains. *Stokes* : Favorable weather is improving the condition.

SOUTH CAROLINA.—*Barnwell* : A fine crop. *Clarendon* : Good crop, now fully matured. *Fairfield* : Splendid crop and well matured ; weather favorable. *Union* : Affected by drought, but will make an average crop. *Marion* : Being well harvested, and is perhaps the best ever grown in this county. *Laurens* : Late crop greatly improved by copious rains.

GEORGIA.—*Catoosa* : Indifferent from unfavorable weather. *Elbert* : Favorable weather, improving condition. *Gwinnett* : Full average crop in about one-half the county, the other affected by storms. *Habersham* : Full average. *Henry* : Affected by drought. *Jasper* : Injured by drought. *Lincoln* : Below an average, though improving. *Towns* : Doing very

well. *Worth*: The finest crop for twenty years. *Clayton*: Unusually good on bottom, but upland materially injured by drought. *Fayette*: Affected by dry weather.

FLORIDA.—*Manatee*: Almost an entire failure, owing to too much rain; the county is almost submerged from the immense quantity that has fallen.

ALABAMA.—*Barbour*: Never better in this county. *Chambers*: Fair average crop. *Clarke*: Yield good. *Crenshaw*: Above an average. *De Kalb*: The favorable weather of the past month has made a decided improvement in the appearance of the crop. *Calhoun*: About an average. *Coffee*: Affected by rust,

MISSISSIPPI.—*Marshall*: About an average crop. *Noxubee*: Ears badly filled; below an average. *Lauderdale*: Late crop slightly injured by drought, but looking well. *Jefferson*: Below an average, from excessive rains.

TEXAS.—*Bell*: Most promising crop for years. *Dallas*: Very good; new crop on the market; price low, 25 cents per bushel. *Polk*: An average. *Rusk*: About 16 per cent. above an average; season favorable to crops on high land. *Upshur*: Average condition with increased yield. *Wood*: Fine crop. *Austin*: Frequent and heavy rains have caused much rotting. *San Jacinto*: About an average. *Kinney*: Injured by an excess of rain.

ARKANSAS.—*Fullon*: Weather favorable and crop fine. *Stone*: Improved by late rains. *Pope*: Full average crop.

TENNESSEE.—*Lincoln*: Twenty-five per cent. below an average. *Sevier*: Will be a full crop. *Union*: Very promising, and condition good. *Greene*: Injured by drought in northern portion of State. *Decatur*: Too much wet weather. *Crawford*: Benefited by late favorable weather. *Perry*: Improved about 10 per cent. by late rains. *Rhea*: Ears not well filled; present weather favorable. *Montgomery*: Unusually fine prospect. *Lauderdale*: Not so good as indicated month ago.

WEST VIRGINIA.—*Morgan*: Reduced to half crop by drought of July and August. *Raleigh*: Crop short, owing to drought. *Putnam*: A most remarkable improvement in condition of corn lately. *Greenbrier*: Very promising. If the season for ripening is favorable, the crop will be very heavy. *Taylor*: Somewhat affected by July drought, but now coming out wonderfully.

KENTUCKY.—*Johnson*: Crop cut short by drought. *Shelby*: Condition of late planting improved by recent rains, and will average three-fourths of a crop. *Bath*: Owing to a protracted drought since the 25th of June, corn will be short of a half crop. *Nicholas*: Owing to six weeks of drought, corn is very light. *Ohio*: Damaged by continued wet weather during the spring. *Russell*: A very poor prospect. This county will be compelled to import corn and meal. *Spencer*: A severe drought since early in July has cut the corn crop short at least one half. *Breckinridge*: Being cut short by drought, particularly the late planted. *Livingston*: Damaged by five or six weeks of drought.

OHIO.—*Clark*: Corn crop was never better, and in ten days will be out of the way of frost. *Hancock*: Injured in some localities by rain. *Montgomery*: Suffering from dry weather. *Ross*: Was generally planted too thick. *Butler*: Promises well. Splendid rains at the critical period. *Gurnsey*: Crop cut short by drought of past month. *Adams*: Some will have a half crop, others a quarter crop, and some nearly nothing, owing to drought since July first. *Athens*: Corn on high lands will be very short on account of drought. *Carroll*: Six weeks of drought have nearly ruined the crop on hill lands. Bottom-land corn will be a moderate crop. *Geauga*: Corn looks remarkably well. The only drawback, a rank growth of weeds. *Holmes*: A fair crop, but somewhat retarded by dry weather. *Monroe*: Materially affected by the drought of the past month. *Morrow*: That on good lands and well cultivated an average crop; on wet land very foul and unpromising. *Seneca*: Corn has had too short a season to make the usual depth of grain; however, the ears are of good size and will make an average crop.

MICHIGAN.—*Hillsdale*: Early planted fair; late planted severely injured. *Oakland*: A little backward, and most fields quite weedy, but looks well. *Saint Joseph*: August drought has reduced some parts of the county to a half crop, while other parts will have a full average. *Lenawee*: Badly injured by dry weather. *Muskegon*: Fields well cared for are much above an average. A luxuriant growth and heavy ear. *Enmet*: Will be a poor crop, owing to drought in July and August.

INDIANA.—*Decatur*: Started late and was blown down badly by storms in August. The crop will be short. *Franklin*: On bottoms and black uplands very good; on clay soils poor. *Howard*: Corn is backward. A killing frost any time in September will be ruinous. *Knox*: Badly damaged in places by drought. *Warren*: Weedy, on account of rain. *Harrison*: Shortened by drought, especially on poor soils. *Dubois*: Drought is shortening corn very much. *Noble*: A good crop this year. *Shelby*: Suffered from drought in August. *Steuben*: For the past three weeks has suffered very much from dry, hot weather. *Marion*: Injured at least 10 per cent. by being blown down July 31.

ILLINOIS.—*Johnson*: Crop cut short by dry weather of past two months. *Woodford*: Quite a failure, owing to extraordinary amount of rain in May and June. *Bureau*: Good, but badly reduced in places by the storms of the 19th and 24th of August. *Jackson*: Badly injured in some parts of the county by extremely dry weather. *Carroll*: Ten days more of good weather will insure a sound crop. *Clark*: Doing well, and in full average condition, except being very needy. *Boone*: Crop shortened by July drought. *Lee*: Has grown well since making a start, and gives promise of fair average yield. *Mason*: August favored corn, except that it was badly blown down by storms. *Warren*: Much of the crop blown down by storms in August. *Massac*: Scarcity of rain since the 1st of July has cut late corn rather short.

WISCONSIN.—*Juneau*: The average will be equal to last year. *Richland*: Doing well; if frost is escaped for two weeks will be sound and good. *Watworth*: Corn promises an average yield if it escapes an early frost. *Waukesha*: Stinted by drought. *Green*: Corn crop never better; major portion out of the way of frost.

MINNESOTA.—*Pope*: Doing well; area greater than last year. *McLeod*: Nearly all ripe enough to cut, and an unusually heavy crop. *Wadena*: Corn will be a heavy crop for the locality if the weather continues good; it is hardening now. *Redwood*: Corn in most excellent condition, but acreage a little less than last year.

IOWA.—*Mahaska*: Not uniform; in some localities unusually heavy, in others light, owing to storms and worms at the roots. *Harrison*: Corn has the appearance of ripening well, though generally weedy. *Howard*: Hot, dry weather, very favorable for ripening corn; no frost to date; may be pronounced out of danger. *Jones*: Injured by rain and wind storm of August 19; nearly all blown flat to the ground. *Polk*: Crop splendid; most of it cured enough to be out of the way of frost. *Louis*: Will not be as heavy as anticipated; worms working in the roots; some blown down by storm of August 24. *Marion*: Early planted injured by being blown down; late planted not earing well. *Pocahontas*: Better than an average. *Clinton*: Weather favorable for ripening. *Jackson*: Damaged in many places by being blown down in August. *Plymouth*: Very backward early in the season, but the warm weather of July and August has given it a fine start.

MISSOURI.—*Caldwell*: Fodder cutting commenced. *Madison*: Crop cut very short by drought. *Moniteau*: Injured at least one-half by drought. *Miller*: Cut short by drought in July and August. *Pemiscot*: Suffered very much for want of rain the past month. *Randolph*: Drying up well for cutting. *Newton*: Promise of heavy crop, but cut short by August drought. *Johnson*: Dried up very fast the past two weeks, and the late planted cut short to some extent. *Laclede*: Too dry for corn since harvest. *Phelps*: Corn backward and severely injured by drought in July. *Saint Charles*: Too wet in the spring, and exceedingly dry in July and August; corn literally dried up. *Saint Francois*: No rain for over two months, which will make late corn short. *Benton*: Cut short by dry and hot weather. *Lincoln*: Crop very much curtailed by dry weather. *Shelby*: Corn plentiful and cheap. *Vernon*: The early planted an extra crop; the late planted a failure.

KANSAS.—*Chautauqua*: Want of rain at filling time will shorten the crop about 10 per cent. *Woodson*: Average condition, but less acreage on account of unfavorable spring. *Montgomery*: Early corn fair; late not half a crop; many fields not worth gathering. *Kingman*: Too dry; crop not promising; sod-corn doing better than that on old grounds. *Washington*: Crop extra good. *Marion*: Damaged a little by dry weather. *Labette*: Cut short by drought. *Cowley*: Corn made by so little labor as to be the wonder of the country; fine corn made by a single cultivation. *Cherokee*: So dry that there is no possibility of more than two-thirds of a crop.

NEBRASKA.—*Richardson*: The best crop ever raised here. *Saunders*: Heat and drought

make the prospect bad. *Nuckolls*: Considerably injured by drought since harvest. *Lancaster*: Crop seriously damaged by dry weather. *Hall*: Corn extra good, but yet in danger of frost. *Wayne*: Corn hard and out of danger of frost.

NEW MEXICO.—*Taos*: A fair crop in this county this season.

DAKOTA.—*Hanson*: The grasshoppers have left only about 45 per cent. of an average crop.

UTAH.—*Tooele*: Corn benefited 100 per cent. by rain in August.

WHEAT.

Our previous returns of the wheat crop represented it in its two important divisions of winter and spring wheat. In September we endeavor to gain a comprehensive idea of the two portions of the crop consolidated. The general average of condition is 87, against 92 in September, 1877. The condition of winter wheat when harvested was 101. At the time of winter-wheat harvest spring wheat presented an unprecedented promise, its average on the 1st of July being 106. Both July and August brought disaster to this portion of the wheat crop. Winter wheat after cutting is always liable to injury from being left in the field exposed to the vicissitudes of the weather, and hence its condition is apt to decline after harvest. The grain also often fails to thrash out according to expectation at harvest-time. All these points are taken into consideration by our correspondents in their September estimates of the whole crop. These indicate a promise 5 per cent. below that of last year. This reduction evidently results mostly from the disasters of the spring-wheat crop in the Northwest. From a preliminary examination of the returns of acreage, it appears that the wheat breadth of 1878 is about one-sixth greater than that of 1877, which will more than counterbalance the loss resulting from the decline in general condition. The present crop will at least equal its predecessor in yield, and most probably surpass it. It is likely to realize the popular estimate of 400,000,000 bushels. The estimates of acreage will be revised after the final returns of the crop come in, when a more definite statement will be practicable. The counties reporting are classified according to condition, as follows:

States.	counties averaging 100.	Counties above 100.	Counties below 100.	Total.	States.	Counties averaging 100.	Counties above 100.	Counties below 100.	Total.
Maine	2	3	4	9	Tennessee	1	28	29	
New Hampshire	4	1	2	7	West Virginia	10	15	6	31
Vermont	3	1	2	6	Kentucky	5	6	24	35
Massachusetts	2			2	Ohio	10	42	3	55
Connecticut	1	1	2	4	Michigan	15	11	7	33
New York	10	17	6	33	Indiana	12	21	1	34
New Jersey	4		3	7	Illinois	23	13	14	50
Pennsylvania	12	17	8	37	Wisconsin	2	1	26	29
Delaware	1			1	Minnesota	5	2	22	29
Maryland	4	3	6	13	Iowa	6	5	32	43
Virginia	8	4	43	55	Missouri	15	13	25	53
North Carolina	3	1	42	46	Kansas	6	5	11	22
South Carolina	1		8	9	Nebraska	2	2	15	19
Georgia	7	5	41	53	California	2		7	9
Alabama	4		8	12	Oregon	1	1	1	3
Mississippi	4		9	13					
Texas	7	12	13	32	Total	191	202	437	830
Arkansas			19	19					

The growth of wheat in Rhode Island, Florida, and Louisiana being inconsiderable, these States are not embraced in the above table.

The following extracts are taken from our returns :

NEW HAMPSHIRE.—*Carroll* : Somewhat injured by grasshoppers, but yield good.

VERMONT.—*Addison* : Harvested in bad condition from an excess of rain. *Orleans* : Good crop.

NEW YORK.—*Genesee* : Yield good, but condition low. *Montgomery* : Large yield ; bad weather for harvesting. *Onondaga* : Some have sowed, others are afraid to sow early on account of the Hessian fly.

NEW JERSEY.—*Warren* : Greatly damaged by the bugs, causing it to fall off ; not filling out well.

PENNSYLVANIA.—*Clearfield* : Good growth and large acreage. *Montgomery* : Poor quality. *Sullivan* : About three-fourths of a crop.

MARYLAND.—*Calvert* : Fine growth of straw, but poor yield of grain.

VIRGINIA.—*Craig* : Will be sown in good condition. *Dinwiddie* : Seriously affected by red rust. *Loudoun* : Quality good, but below an average crop ; open winter and late frosts the cause. *James City* : Discouraging failure, from hail and rust. *Louisa* : Very poor crop. *Montgomery* : Condition low and quality inferior. *Prince Edward* : Yield since thrashing shows about half an average crop. *Northampton* : Rust has greatly affected both quality and quantity. *Prince George* : In consequence of rust and hail-storms the general condition is lower than I ever knew it in this county. *York* : Badly damaged by rust.

NORTH CAROLINA.—*Alamance* : Two-thirds of an average crop. *Cabarrus* : Inferior quality. *Tyrrel* : Injured by rust ; yield small. *Union* : Poor crop. *Wilkes* : Injured by rust.

SOUTH CAROLINA.—*Clarendon* : Badly affected by rust.

GEORGIA.—*Jasper* : Below an average. *Towns* : Injured by rust and smut.

ALABAMA.—*Crenshaw* : Below an average.

TEXAS.—*Dallas* : Damaged by June rains ; will make poor flour, musty. *Rockwell* : Injured since harvesting by excessive wet weather. *Somerville* : Greatly damaged since harvest by continued wet weather. *Upshur* : Yield large, but condition reduced by continued rain. *Victoria* : Damaged 50 per cent. after harvesting by rain. *Collin* : Badly damaged in the shock by rain.

ARKANSAS.—*Fulton* : Complete failure ; great discouragement ; little preparation for fall sowing. *Pope* : About one-third of a crop only realized after thrashing.

TENNESSEE.—*Union* : Yield quite low and quality very indifferent ; about half the crop of last year. *Greene* : Seriously damaged by rust ; poorest crop for many years. *Roane* : Very small yield, in bad condition ; early attacked by rust. *Meigs* : Reduced one-fifth by rust after harvesting.

WEST VIRGINIA.—*Raleigh* : Injured by fly, rust, and excessive heat after heading. *Greenbrier* : Far surpasses any former crop ; will probably average 22 to 25 bushels per acre without any fertilizer ; as far as thrashed the Lancaster wheat is giving the best yield. *Randolph* : Damaged to a small extent in the stack. *Monroe* : Of average quality but small yield.

KENTUCKY.—*Johnson* : Turned out bad ; the failure not detected until harvested. *Metcalfe* : Quality good, but average condition not more than 70. *Shelby* : Quality equal to any former season, but heads did not fill well. *Ohio* : Damaged by rust and Hessian fly. *Russell* : As good as ordinary years, with greater acreage. *Spencer* : In the early spring very promising, but cool weather later, rust, and midge damaged the crop extensively. *Graves* : Yield not over 40 per cent. of an average crop. *Breckenridge* : Not turning out as well as expected at harvest.

OHIO.—*Hancock* : By far the largest crop ever raised in the county ; some yielding as high as 45 bushels per acre. *Erie* : Quality good and generally saved in good order. *Wayne* : Wheat harvest good ; will average about 28 bushels per acre. *Ross* : Wheat never better. *Van Wert* : Damaged to a great extent by wet weather. *Butler* : Not meeting expectations, but yield a little over an average. *Geauga* : The crop exceeds anything ever raised in

the county; average from 20 to 35 bushels per acre; gold-medal wheat from the department produced at the rate of 33 bushels per acre. *Holmes*: Averaging 25 bushels per acre from the thrashing-machine. *Morrow*: An average of 20 bushels per acre, with some instances of over 30 bushels per acre. *Seneca*: Being marketed in fine condition; no difference in price between the new and old wheat.

MICHIGAN.—*Grand Traverse*: Winter wheat above and spring wheat below an average; weather fine through harvest. *Bay*: Spring wheat not over a half crop; winter and spring wheat together about 80 per cent. of an average crop. *Montcalm*: Wheat crop never better. *Oakland*: Quality not quite as good as the crop of last year; a large growth of straw. *Lenawee*: Average 25 to 30 bushels per acre; grain not shrunken as bad as expected. *Charlevoix*: Injured by drought. *Emmet*: Secured in good condition; no rain falling during harvest.

INDIANA.—*Decatur*: Condition good; weather favorable for thrashing. *Franklin*: Wheat good; will probably average 16 bushels per acre. *Howard*: The best crop ever known, both in quality and quantity, yielding from 20 to 45 bushels per acre. *Harrison*: Quality not quite as good as last year. *Noble*: A good crop of wheat, will probably average 18 bushels per acre; more wheat in this county than ever before. *Steuben*: Better than expected; will average fully 22 bushels per acre.

ILLINOIS.—*Bureau*: Quality good; will average about 12 bushels per acre. *Jackson*: Excellent quality and greater acreage, but smaller yield than last year. *Madison*: Yielding less at thrashing than was expected. *Pike*: Lighter yield than anticipated, but quality never better; the Fultz wheat sent out by the department is taking the lead. *Carroll*: Winter wheat is of No. 1 quality, averaging 25 bushels per acre; spring wheat about half that amount, and of inferior quality. *Boone*: Spring wheat a fair crop, but kernel somewhat shrunken; product 12 to 20 bushels per acre. *Lee*: Inferior in quality, but equal in quantity to last year's crop. *Winnebago*: Injured by warm and wet weather while ripening.

WISCONSIN.—*Grant*: But little fall wheat grown. Quality never better. Some of that thrashed yielded 32 bushels per acre. Spring wheat is the poorest crop in the county. *Juneau*: Winter wheat is a good average crop, but very little is raised in this county. The spring wheat crop is the poorest ever raised in this county, and will not make over three bushels per acre. *Washington*: Winter wheat a great crop; yielding from 20 to 35 bushels per acre. Spring wheat only from 5 to 14 bushels per acre. The acreage of winter wheat is about one-fifth that of spring wheat. *Jefferson*: Winter wheat at least 120 in quality, but spring wheat, owing to hot weather in July, is not over 50, and will grade about No. 3. Straw enough for 30 bushels per acre with an average yield of 12 bushels. *Richland*: Winter wheat somewhat bleached by rain, but averaging about 20 bushels per acre. *Rock*: Winter wheat excellent. Average from 20 to 40 bushels per acre. One piece reported to average 50 bushels. *Walworth*: Spring wheat averages about 14 bushels per acre and grain of a poor quality. Winter wheat a full crop and good quality, but small acreage. *Waukesha*: Spring wheat about 20 bushels per acre, but grain shrunken and will grade as No. 3 or No. 4. *Monroe*: Spring wheat not more than one-third of a crop. Fall wheat very fine, its condition about 105. *Fond du Lac*: Grades Nos. 3 and 4, and will average about 7 bushels per acre. *Calumet*: Quality fair, but yield very low. *Winnebago*: Injured by excessively hot weather.

MINNESOTA.—*Mower*: The crop of this county nearly a total failure, owing to heat and rain at the time of filling; only about four bushels of rejected grain per acre. *Isanti*: Crop turning out well. *Pope*: Ripened very rapidly, yielding better than anticipated. Much wheat yet in the shock. *Le Sueur*: An average of 10 to 16 bushels per acre, but of poor quality. *Rock*: Fully 20 per cent. of crop left uncut. Yield of that thrashed 10 to 12 bushels per acre. Nos. 2, 3, and 4 will not pay expenses. *Wright*: In some parts of the county very good. In the timber section badly pinched. Very little No. 1 grain raised. *Becker*: Somewhat damaged by heat, but still a good crop. *McLeod*: Spring wheat yielding about 15 bushels per acre, which grades Nos. 2 and 3. *Sibley*: Wheat grades No. 4; yield from 12½ to 16 bushels per acre. *Fillmore*: Mostly in the stack. Where thrashed weighs from 45 to 50 pounds per bushel. *Goodhue*: The present crop the poorest for twenty-two years. Excessive heat produced head blight, and arrested development of the kernel. *Redwood*: Badly

damaged by excessive heat early in August. An average of about 18 bushels per acre of No. 3 wheat; but little will grade No. 2. Many acres went back to the ground for want of help to harvest it. *Watomwan*: Heaviest growth of straw ever known; down when harvested; injured by blight, will grade mostly No. 3 and rejected.

IOWA.—*Humboldt*: Very poor in quality. *Mahaska*: The largest wheat crop for several years. *O'Brien*: Fall wheat good. A great deal lost by wet weather. *Harrison*: Wet harvest; gathered in a damaged condition. *Howard*: The crop a total failure. Some samples thought to be fair before threshed have been returned from market rejected. *Jones*: Spring wheat not as good as expected; injured by chinch bug and rust. The early sown has yielded about a half crop. *Lee*: The yield of winter wheat large, and quality all that could be desired. Spring wheat but little grown now. *Madison*: About 9 bushels per acre. "Quality No. 3 to no grade." *Polk*: Wheat almost ruined by wet, hot weather. *Allamakee*: Thrashers report spring wheat as yielding 4 to 8 bushels per acre; exceptional fields 10 to 15 bushels. Quality poor. *Marion*: Yielding less than expected. Early sown, of good quality; late sown, inferior. *Lyon*: New wheat grades No. 3, on an average. Some fields uncut because down and of inferior quality. *Pocahontas*: Injured by hot weather in July. *Clinton*: Very light average, not over 10 bushels per acre. *Grundy*: Did not fill well in many places; extreme heat supposed to be the cause. *Cherokee*: A portion of the crop lodged by storms. *Plymouth*: Grew very heavy straw; lodged, rusted, and struck with blight. Of very light weight.

MISSOURI.—*Caldwell*: Quality extra, but yield less than was expected. *Iron*: Average about 5 bushels per acre. Quality fair. It was cut by frost while in bloom. Gold-dust wheat earlier than any other variety; 7 quarts received from the Department produced 55 quarts. *Jasper*: Injured by rust before heading. *Madison*: Injured by intense heat. Fultz wheat succeeds admirably. *New Madrid*: Yield only about half that expected when harvested, and quality poor. *Newton*: Plump and good; average about 10 bushels per acre; some damaged by rain. *Laclede*: Not much over half crop, owing to alternate wet and dry weather. *Phelps*: Thrashing far short of expectations. A warm open winter is believed to have prevented stooling. Quality good. *Stoddard*: Sound and in good condition, but less than half a crop. *Holt*: Fall wheat 30 to 35 bushels per acre; spring wheat, 7 to 15.

KANSAS.—*Clay*: Greatly damaged by rains after harvest. *Montgomery*: Eight bushels per acre and quality good. *Washington*: Very little good spring wheat; damaged by chinch bugs. Will average about 12 bushels per acre. *Marion*: Does not yield at thrashing as much as was expected. *Cowley*: Crop very fine; average yield about 18 bushels per acre. *Cherokee*: Every one disappointed. A large growth of straw, but yielding only $3\frac{1}{2}$ to 12 bushels per acre—general yield about 6 bushels; quality excellent.

NEBRASKA.—*Richardson*: Some spring wheat not worth cutting. *Saunders*: Injured by hail-storms; will average about 7 bushels per acre. *Lancaster*: Spring wheat yielding from 7 to 12 bushels per acre. *Wayne*: Wheat poor in quality, grading Nos. 2 and 3 and rejected.

CALIFORNIA.—*Plumas*: Suffered from rust; some fields of late wheat not worth harvesting. *Shasta*: Not affected by rust in this county. *Sonoma*: Crop nearly ruined by cheat and smut. *Yuba*: The crop has been seriously injured by excessive rains, killing out some of the grain, and causing an unusual growth of weeds. *Placer*: Good in berry, but foul with cheat and other trash, causing a depreciation in quality.

OREGON.—*Clackamas*: Fall wheat and early spring grain a full average, both in quality and quantity; but late spring wheat greatly damaged by the hot sun. *Linn*: The crop lighter than usual.

NEW MEXICO.—*Taos*: Below an average on account of the severe drought of May, June, and July. *San Miguel*: Injured by hail. *Mora*: Wheat struck with rust; 40 probably too high for average condition. *Valencia*: Quality of grain much better, and yield fully 10 per cent. better than last year.

UTAH.—*Tooele*: A part shelled by heavy wind storm July 3, and wheat not then ripe; shriveled.

OATS.

The condition of oats averages 97 against 100 in August, 101 in July, and 103 in June. Last year the September average was 106 against 98 in August, and presented an exceptionally high condition. The preliminary estimate in June indicated an increase of 9 per cent. in the average. The yield will probably fully equal that of 1877, which amounted to over 400,000,000 bushels. The highest State average, 115, was in Connecticut, and the lowest, 76, in Texas. In several instances it is noted that where the wheat crop presents a high condition oats are comparatively poor, and *vice versa*. The New England crop is but 2 per cent. below average, but southward along the coast the condition falls to 82 in North Carolina. The Gulf States fall to 87 on the whole, but the Southern inland States, where the wheat crop was inferior, the condition of oats rises to 7 per cent. above average. The States north of the Ohio River and west of the Mississippi average 98, while the Pacific slope goes down to 90. The counties reporting this crop are classified by condition as follows:

States.	100.	Under 100.	Over 100.	Total.	States.	100.	Under 100.	Over 100.	Total.
Maine	2	5	2	9	Texas	10	18	14	42
New Hampshire	2	5	7	14	Arkansas	8	7	7	22
Vermont	3	2	1	6	Tennessee	14	2	13	29
Massachusetts	2	3	5	10	West Virginia	6	7	18	31
Rhode Island	1	1	1	3	Kentucky	9	3	23	35
Connecticut	1	1	2	4	Ohio	14	15	26	55
New York	9	19	5	33	Michigan	15	17	2	34
New Jersey	3	2	3	8	Indiana	16	6	12	34
Pennsylvania	17	9	13	39	Illinois	16	8	27	51
Delaware	1	1	1	3	Wisconsin	10	13	6	29
Maryland	4	6	2	12	Minnesota	7	9	13	29
Virginia	16	23	16	55	Iowa	15	20	8	43
North Carolina	17	22	4	43	Missouri	20	12	21	53
South Carolina	7	2	2	11	Kansas	6	8	8	22
Georgia	10	22	23	64	Nebraska	7	8	4	19
Florida	4	5	4	13	California	2	3	1	6
Alabama	2	3	12	17	Oregon	1	1	1	3
Mississippi	10	4	3	17					
Louisiana	2	1	2	5					
					Grand total	297	290	295	882

TOBACCO.

The twelve largest tobacco States, representing about 95 per cent. of the total product, report the September condition of the crop as follows: Kentucky, 68; Virginia, 90; Missouri, 87; Tennessee, 94; Maryland, 89; Pennsylvania, 90; North Carolina, 97; Ohio, 82; Indiana, 90; Connecticut, 115; Illinois, 79; Massachusetts, 109. The general average of these States is 81, against 80 in August. The Connecticut Valley has had a prosperous season and reports a large crop of excellent quality. The Chesapeake region as a whole falls about 8 per cent. below average. The following notes illustrate local aspects of the crop in this region:

MARYLAND.—*Saint Mary's*: Improved by late rains; acreage reduced a third. *Calvert*: Below average.

VIRGINIA.—*Dinwiddie*: Injured by a heavy hail-storm August 2. *Halifax*: Unfavorable season. *Mecklenburg*: Greatly improved by late rains. *Pittsylvania*: Good crops on a small acreage. *Campbell*: Below average, but improving. *Prince Edward*: Acreage re-

duced one-half; growth and quality fine. *Greene*: Injured by a heavy storm August 17. *Fluvanna*: Good.

NORTH CAROLINA.—*Yadkin*: Late rains doing good. *Orange*: Seriously injured by hail. *Stokes*: Fine weather for the crop.

The Western tobacco-fields all show the result of unfavorable conditions of growth, especially in Kentucky, which reports only two-thirds of an average. South of the Ohio River the condition reaches 73; north of that river, 84; west of the Mississippi and Missouri averages but 87.

BUCKWHEAT.

Reports are numerous of injury from drought. The condition for September is 96 for the whole country, against 98 for the same month in 1877.

POTATOES.

The condition of the potato crop is very much below the report of 1877. The condition for the country is 73, against 99 in September, 1878.

Forty-eight per cent., nearly one-half the crop of 1877, was raised in the New England and Middle States, which this year will not produce, from present indications, more than 50,000,000 bushels, against 80,000,000 in 1877.

The following extracts from the September returns are given:

MAINE.—*Androscoggin*: Not more than half a crop. *Piscataquis*: Nearly all killed by rust. *Sagadahoc*: Greatly injured by drought and bugs. *Waldo*: Decaying badly from excessive wet weather.

NEW HAMPSHIRE.—*Carroll*: Yield small owing to devastating bugs. *Cheshire*: Badly blasted and attacked by bugs. *Sullivan*: Yield small; condition low.

VERMONT.—*Orleans*: Yield light and badly rusted. *Caledonia*: Badly rusted, and rotting in many places.

MASSACHUSETTS.—*Berkshire*: Vines in some localities drying up from effects of blight.

NEW YORK.—*Allegany*: Very small yield. *Madison*: Injured by bugs and dry weather. *Broome*: Very unpromising; affected by frost after planting. *Genesee*: Badly blighted; short about 25 per cent. *Warren*: Early crop nearly a failure; attacked by white grub. *Delaware*: Rotting badly. *Saratoga*: Many fields a complete failure, others give a fair yield. *Onondaga*: General condition bad.

PENNSYLVANIA.—*Cambria*: Tops nearly dead from effects of drought; bugs abundant. *Clearfield*: Rather a failure. *Beaver*: Crop poor, owing to bad coming up and unfavorable weather of this month. *Montgomery*: Early crop about an average, but late planted, owing to drought, almost an entire failure. *Sullivan*: Half a crop. *Columbia*: From causes unknown the vines never fully developed; general condition low. *Lawrence*: About half a crop. *Jefferson*: Materially injured by drought during August. *Indiana*: Scarce half a crop. *Lycoming*: About 50 per cent. of an average yield.

In the States north of the Ohio and west of the Mississippi the condition of the crop is unpromising, the crop of 1877 being about 71,500,000 bushels, while that of 1878, as indicated by the September reports, will be about 53,000,000 bushels, or but 74 per cent. of the product of these States in 1877. A few extracts from correspondence are given below:

OHIO.—*Erie*: Too wet and hot for potatoes; crop light. *Guernsey*: Late potatoes cut short by severe drought of past month. *Adams*: The early crop did exceedingly well; the late crop will be nearly a failure. *Carroll*: Potatoes, both early and late, a poor crop. *Geauga*:

Early potatoes fine, but more small ones than usual; late crop will be somewhat shortened; dry weather ripening them off a little too soon. *Holmes*: An abundant yield. *Morrow*: The crop will fall below expectations, owing to very wet weather and growth of weeds. *Seneca*: Early potatoes small and few in the hill; late potatoes ditto.

MICHIGAN.—*Grand Traverse*: Damaged by drought in the greater part of the county. *Oakland*: Early potatoes nearly a failure, but the late crop excellent. *Tuscola*: Much poorer yield than was indicated by the early part of the season; cause unknown. *Charlevoix*: Potatoes injured by drought. *Lawrence*: Potato crop injured by the Colorado beetle and drought. *Emmet*: Will be a poor crop owing to drought.

INDIANA.—*Decatur*: Too dry for potatoes; crop will be short. *Howard*: Rotting from excessively wet weather. *Harrison*: Prospects very unpromising for late crop; without good rains soon will be an entire failure. *Dubois*: Late potatoes very much shortened by drought. *Ripley*: Early potatoes dug and rotting very badly.

ILLINOIS.—*Carroll*: Early varieties good, the late poor. *Boone*: Potatoes rusted; almost a failure, even on the best and well-tilled lands. *Lee*: The late crop will be light. *Winnebago*: Has been too dry since latter part of July for late potatoes. *Massac*: Rather short for want of rain since July 1.

WISCONSIN.—*Juneau*: Will be about equal to last year. *Douglas*: Dry weather and potato-bugs have injured the crop; but as yet the extent of injury is not known. *Walworth*: A moderate yield, but rotting in the hill. *Waukesha*: Materially injured by drought.

MINNESOTA.—*Otter Tail*: In old ground have been somewhat damaged by Colorado beetles; the early rose affected with "scab." *Redwood*: A good crop, and excellent in quality; early rose worthy of cultivation here.

IOWA.—*Howard*: Variable in size; badly dwarfed by potato-beetle. *Polk*: Early potatoes good, the late only an average. *Marion*: Not up to expectations.

MISSOURI.—*Scott*: Owing to a protracted drought late potatoes will be almost an entire failure. *Newton*: Irish potatoes comparatively good; sweet potatoes not sufficiently grown to report. *Johnson*: Dry weather has killed the vines of the late potatoes; early potatoes a good crop. *Phelps*: Potatoes will be a short crop on account of drought in July. *Saint Charles*: Late potatoes almost an entire failure. *Saint Francois*: No rain for over two months, which will cut the potato crop short. *Benton*: Late potato crop will be short. *Vernon*: Early crop extra, but late crop almost past redemption from drought.

KANSAS.—*Woodson*: Will be 25 to 30 per cent. below an average owing to wet weather. *Montgomery*: Late potatoes cut short by drought. *Marion*: Spring too wet for early potatoes. *Bourbon*: Prospect very unpromising on account of dry weather.

RYE.

Only six states—Vermont, Connecticut (the highest, 112), Alabama, West Virginia, Ohio, and Minnesota—report the condition of rye above 100. In Rhode Island, Pennsylvania, Florida, and Oregon the crop is an average one, while in the other States the figures range 80 to 99. The condition for the country is much below that of last year, being 83 against 101.

BARLEY.

Excessive rains have reduced the September condition from 98 last year to 95 in 1878. There is much complaint of discoloration of the grain. But two States report condition above 100 (Connecticut, 110, and Indiana, 101) and two at 100 (Rhode Island and Ohio). Of the other States reporting, Pennsylvania is the highest, 99, and Oregon the lowest, 84.

SORGHUM.

Not equal to the September average of 1877. The September returns of 1878 indicate a condition of about 84 for the whole country.

HOPS.

No improvement in condition since August report. Juneau County, Wisconsin, reports only one-tenth of a crop, while the crop is a total failure in Richland on account of lice on the leaves. The correspondent for Laramie, Wyoming, says: "Naturally adapted to the growth of hops. They are growing luxuriantly in all the valleys and are of very good quality."

SWEET POTATOES.

The condition of this crop is above average in New Jersey, South Carolina, Alabama, Louisiana, and West Virginia, and full average in Connecticut, Delaware, Maryland, Georgia, and Texas. In the States of heaviest production the September returns of condition are: New Jersey, 103; North Carolina, 96; South Carolina, 101; Georgia, 100; Alabama, 104; Mississippi, 99; Louisiana, 102; Texas, 100; Tennessee, 95.

FRUIT.

APPLES.—All the New England and Pacific States report apples a full average, except Vermont. Some injuries by storms are noted in Maine. Texas and Ohio are also above average and all the other States below.

PEACHES.—The only States reporting full average or above are Alabama 107, Texas 111, Tennessee 124, Ohio 107, Illinois 115, Iowa 117, Kansas 104, and Nebraska 118. The lowest, 25, is in Delaware.

GRAPES.—Average condition, or above, reported in Rhode Island, Delaware, Florida, Louisiana, Texas, and the Pacific States.

STOCK HOGS.

The number of stock hogs is about 4 per cent. less than last year. An increase is noted in the New England, South Atlantic, Gulf, and Pacific States. The Middle States show a small decrease as well as all sections of the Mississippi Valley. In the inland Southern States the decline is almost a fourth.

Table showing the condition of crops, &c., on the 1st day of September, 1878.

STATES.	CORN.	WHEAT.	RYE.	OATS.	HARLEY.	BUCK- WHEAT.	POTATOES.		TOBACCO.	COTTON.	SORGHUM.	SUGAR- CANE.	STOCK HOGS.		APPLES.	PEACHES.	Average condition September 1.
							Average condition September 1.	(<i>Solanum tuberosum</i>) Average condition September 1.					Number for fat- tening compared with last year.	Average condition as to weight and size.			
Maine	105	102	95	97	95	94	77	77	100	100	100	100	95	101	101	87	95
New Hampshire	97	98	98	94	96	101	93	93	100	100	100	100	101	101	101	87	96
Vermont	102	105	101	94	93	99	76	76	100	100	100	100	96	101	101	87	95
Massachusetts	102	105	107	94	96	106	77	77	100	100	100	100	96	101	101	87	95
Rhode Island	100	100	100	100	100	100	95	95	100	100	100	100	96	100	100	87	100
Connecticut	110	97	112	115	110	112	95	95	100	100	100	100	96	100	100	87	100
New York	98	105	99	91	89	102	70	70	100	100	100	100	110	101	101	70	75
New Jersey	103	80	100	99	96	99	88	88	100	100	100	100	97	100	100	70	74
Pennsylvania	79	103	90	99	96	101	71	71	80	90	90	90	100	100	100	62	67
Delaware	90	100	90	85	95	95	98	98	100	100	100	100	99	100	100	25	100
Maryland	89	102	97	93	99	99	98	98	100	100	100	100	99	100	100	38	94
Virginia	95	88	85	93	99	99	101	101	90	83	97	97	99	99	99	86	86
North Carolina	92	69	94	82	99	99	96	96	97	86	96	96	103	100	97	86	91
South Carolina	99	70	95	94	95	99	96	96	103	81	96	97	104	102	97	78	95
Georgia	95	75	100	93	93	104	96	96	98	91	103	104	104	102	97	88	102
Florida	94	65	101	92	93	108	96	96	99	92	103	104	107	107	95	84	91
Alabama	103	78	101	100	99	104	106	106	103	90	97	104	102	97	96	84	91
Mississippi	98	78	82	97	99	102	106	106	103	83	97	104	102	97	96	88	100
Louisiana	108	97	101	76	93	100	91	91	101	101	101	102	106	102	102	111	104
Texas	106	97	101	95	93	100	101	101	101	101	101	101	106	102	102	111	104
Arkansas	101	51	80	95	95	99	98	98	97	98	95	94	102	97	72	93	104
Tennessee	90	55	91	110	99	97	108	108	94	91	93	100	94	100	80	124	91
West Virginia	95	73	102	96	96	101	98	98	101	91	100	100	100	101	90	81	80
Kentucky	73	71	91	110	95	92	93	93	68	74	74	74	93	92	68	74	87
Ohio	94	110	102	102	100	103	82	82	82	93	93	93	96	99	106	91	87
Michigan	92	104	99	99	92	92	88	88	95	93	93	93	101	99	76	91	66
Indiana	92	111	99	102	101	100	88	88	95	93	93	93	97	96	96	91	70
Illinois	89	97	96	102	91	91	85	85	79	93	89	89	91	94	83	115	82
Wisconsin	100	63	99	103	87	88	84	84	97	93	103	103	98	99	67	81	79
Minnesota	104	59	107	103	91	100	97	97	97	99	100	100	103	98	81	85	85
Iowa	99	66	97	97	90	95	91	91	91	99	100	100	94	99	74	117	70
Missouri	87	95	93	100	92	88	96	96	87	99	91	92	96	97	75	95	73
Kansas	91	80	92	100	97	90	71	71	95	99	97	97	101	100	87	104	97
Nebraska	119	88	97	83	90	92	106	106	112	90	106	106	123	102	91	118	97
California	100	88	90	90	88	90	98	98	106	90	106	106	110	102	100	90	100
Oregon	100	87	100	87	84	87	78	78	106	90	106	106	110	102	102	87	100

DEPARTMENT OF AGRICULTURE.
SPECIAL REPORT—No. 9.

REPORT

UPON THE

CONDITION OF CROPS

DECEMBER 1, 1878.



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1878.

CONDITION OF CROPS.

WHEAT.

The October returns, showing comparative product, did not materially change the aspects of the wheat crop as foreshadowed in our previous monthly reports of condition. The December returns of yield per acre confirm and somewhat enlarge our previous estimates. The crop of 1878 was, beyond doubt, the largest ever raised in this country. On the Atlantic slope, above Delaware Bay, the crop was full average in quality and considerably larger than in 1877.

In the States south of Mason and Dixon's line and of the Ohio River, Texas alone shows an increased yield, which is also of superior quality. In this region, compared with last year, there is a net loss of nearly 10,000,000 bushels, and the crop is generally very poor in quality, especially in the Southern inland States—Arkansas reporting but a third, of an average quality. Several of our correspondents in this region intimate that wheat-growing will, in their counties, be practically abandoned. This, however, is a conclusion which the future will, most probably, not justify.

North of the Ohio River there is an increase of about 20,000,000 bushels, in spite of a falling off in Illinois and Wisconsin, caused by injuries to the spring wheat. The quality in all these States except Wisconsin is superior, rising to 26 per cent. above average in Indiana.

West of the Mississippi River the yield has increased over 15,000,000 bushels, in spite of the heavy losses in the spring wheat of Minnesota, Iowa, and Nebraska. The wheat acreage of these States has increased to such an extent as to largely overbalance the decreased yield per acre, which has fallen off in all these States except Kansas. This State has not only doubled her average yield, but shows a very superior quality of grain; the other States report a quality below average.

On the Pacific slope there has been an increase both in acreage and average yield, resulting in a crop nearly double its predecessor. The quality of the grain here is also very greatly above average.

This year has been especially favorable to the winter wheat, which enjoyed, on the whole, exceptionally favorable conditions during its whole season of growth. The extreme heat of summer caught the spring wheat in a very critical stage, and cut that crop short over 30,000,000 bushels compared with what it would have been at the same rate of yield as in 1877. The total yield of this year is somewhat above 425,000,000 bushels. Some remarkably high average yields of winter wheat will be seen in the notes below.

MAINE.—*Penobscot*: Fair average yield, in good condition; fine growth of straw. *Sagadahoc*: Acreage at least one-fourth greater than last year, with increased yield; not well filled, in consequence of drought in July. *Waldo*: Largest crop for years. *Piscataquis*: Crop generally reduced by storms, but some fields average 20 bushels per acre.

NEW HAMPSHIRE.—*Rockingham*: Generally good; about an average.

VERMONT.—*Caledonia*: Best crop for many years, some fields yielding 40 bushels per acre; acreage increased.

NEW YORK.—*Allegany*: First-class crop. *Westchester*: Grain poor, but large yield of straw. *Schuyler*: Light yield, owing to Hessian fly. *Suffolk*: Has not turned out as well as was expected at harvesting. *Oncida*: Injured by frost and drought. *Genesee*: Crop average, but less than last year; average weight per bushel, 3 pounds less. *Montgomery*: Grain dropped badly from being left too long in the field after cutting. *Wyoming*: Spring wheat averaged 7 bushels per acre.

NEW JERSEY.—*Cape May*: The shrinkage in condition is caused by late sowing, the ground being so dry that it was almost impossible to prepare it for the seed, and if sown it would not germinate. *Warren*: Almost an entire failure, from bug in the straw. *Middlesex*: Badly injured by the fly. *Somerset*: Injured by the fly.

PENNSYLVANIA.—*Butler*: The yield is not so large as expected; heads poorly filled and grain light. *Clinton*: Owing to dry weather after sowing, the crop is small. *Northampton*: I wish to modify my previous figures. Everything considered, the crop is about one-fourth of an average, the failure being attributable to the Hessian fly. *Sullivan*: Large growth of straw and the grain small. *Cumberland*: Injured by drought. *Bedford*: Very good crop, well matured; many fields yield 35 bushels per acre. *Tioga*: Quality good, but yield not so large as last year. *Bucks*: The finest crop harvested in this county for fifteen years. *Elk*: Badly injured by frost and rust. *Cambria*: Backward in growth on account of dry weather. *Northampton*: General condition very low. *Potter*: The acreage exceeds that of last year; small yield and poor quality in north of county, but in the south both very good.

DELAWARE.—*Kent*: Acreage one-fifth greater than last year.

MARYLAND.—*Calvert*: Yield small and quality inferior. *Queen Anne*: Badly injured by rust and mildew from rains in June.

VIRGINIA.—*King and Queen*: Fifty per cent. less than last year. *Highland*: A good yield. *Matthews*: Greatly injured by rust. *Prince Edward*: Quality fair, but product very low. *Pulaski*: Yield about half that of last year; quality inferior. *Campbell*: Since thrashing, yield is found not so good as expected; rather light in weight. *Southampton*: Very seriously injured by rust; grain shriveled and light. *James City*: Materially injured by hail and rust. *Loudoun*: Yield not so good as last year; quality finer. *Madison*: Greatly injured by rust, and quality generally inferior. *Chesterfield*: Three-fourths of an average yield, of inferior quality. *Brunswick*: Half a crop. *Dinwiddie*: Nearly ruined by rust and hail, yet the price is low.

NORTH CAROLINA.—*Beaufort*: Large yield as the result of greatly increased area. *Caldwell*: Larger area sown, which yielded, however, not more than half a crop. *Cherokee*: Badly injured by rust. *Columbus*: Suffered much from rust. *Duplin*: Very small yield, with greatly increased area. *Greene*: Short crop, on account of cold, late spring. *Wilkes*: Injured by rust. *Chowan*: Badly damaged by rust; quality very inferior. *Cherokee*: Greatly damaged by rust. *Gaston*: Average reduced by heavy storm. *Hertford*: Almost a failure this season. *Jackson*: Increased acreage and large yield. *Gales*: Very small crop. *Stanley*: Small yield; crop badly sown and not fertilized.

SOUTH CAROLINA.—*Chesterfield*: Crop shortened by rust. *Fairfield*: Acreage increased, but owing to rust the yield was smaller and quality inferior to last year. *Greenville*: Reduced by drought. *Lexington*: The product has fallen much below our early anticipations. *Spartanburg*: Yield small and of inferior quality. *Towns*: Reduced by rust and smut to 75.

GEORGIA.—*Cobb*: The yield is at least 15 per cent. less than last year, with acreage unchanged. *Warren*: About 10 per cent. less than last year. *Wilkes*: Not more than half a crop. *Jackson*: Small crop.

ALABAMA.—*Barbour*: Very little grown in this county. Could we procure a rust-proof variety we could raise sufficient for home consumption.

TEXAS.—*Williamson*: Early sown averaged about 23 bushels per acre, while the late gave only 11. *McLennan*: About three-fourths of our crop was sold in the summer at an average of 55 cents per bushel; good spring sold generally at 40 to 45 cents per bushel. *Burnet*: Good yield, owing to increased acreage. *Upshur*: But sparsely sown in this county, although the acreage is increasing. *Kendall*: Season favorable and yield fine. *Red River*: Injured by continued rains. *Upshur*: Product greater than last year; quality injured by rains of May and June. *Rockwall*: Quality materially injured by excessive rains.

ARKANSAS.—*Woodruff*: Injured by rust; not over one-fourth of a crop. *White*: In many sections it has not paid to harvest. *Pope*: Yielded about one-third of a crop of inferior quality. *Polk*: Almost a failure. *Woodruff*: Scarce worth harvesting. *White*: Owing to repeated failures farmers have measurably abandoned the crop. *Prairie*: Not enough raised for seed.

TENNESSEE.—*Bledsoe*: Fallen off one-fourth, through rust. *Lincoln*: The area sown was at least 30 per cent. greater than in 1877, but the yield per acre was less by 50 per cent. *Union*: Almost a failure in portions of county. *Bradley*: Small and poor; rust. *Henry*: Yield small and of inferior quality.

WEST VIRGINIA.—*Ritchie*: Thrashed out finely. Where injured by rust the grain a little shrunk. *Braxton*: An average crop, and above an average in quality. *Greenbrier*: Crop abundant, but damaged in the stack by wet weather; selling at 85 cents. *Mercer*: A greater crop than for ten years. *Nicholas*: Quite a failure in yield, but greater acreage than usual. *Raleigh*: Injured by rust and storms. *Jefferson*: The largest average yield was 47½ bushels per acre on 15 acres, but some fields ran as low as 3 bushels. *Monroe*: Heavy straw, with light grain yield.

KENTUCKY.—*Laurel*: Damaged by rust while in bloom; grain shrunk and shriveled. *Shelby*: Heads did not fill well, but increased acreage will make up the deficit. *Lincoln*: Quality not so good, but acreage larger than last year. *Nicholas*: Not a heavy yield, but quality good and an increased acreage. *Russell*: Cut short by rust.

OHIO.—*Clark*: A splendid crop; will average 20 bushels per acre, some fields producing 40; Clawson wheat, 30 to 40. *Perry*: The best crop raised in the county for many years, and harvested in splendid condition. *Ross*: Product greater than last year in some localities and less in others, while the increased acreage swells the product. *Morrow*: More than an average acreage; yield from 20 to 30 bushels per acre. *Erie*: Somewhat damaged in the stack. *Geauga*: Exceeds any previous crop in acreage and yield, but quality no better than that of last year; 35 bushels per acre not an uncommon yield. *Noble*: Best crop for many years. *Williams*: Crop better than ever before, but from some cause it does not make good flour. *Clermont*: Injured by rust; yield reduced 20 to 30 per cent. *Hancock*: This year's crop the largest ever known; Fultz ahead. *Darke*: The crop about one-third larger than last year, and of better quality. *Lorain*: Came out well; is of excellent quality. The Fultz wheat will take the lead in this county, at least for a few years. This season some of this variety has weighed as high as 68 pounds per bushel, and at 60 pounds per bushel will yield a fraction over 50 bushels per acre. *Portage*: Heavy crop and low prices.

MICHIGAN.—*Grand Traverse*: Spring wheat a light crop, but an extra yield of winter wheat, making the product fully equal to last year. *Clinton*: Acreage increased about 25 per cent., but a decline of about 10 per cent. in quality compared with last year. Heat in June and July caused the grain to shrink. *Newaygo*: An unusually large acreage; the crop by far the largest ever raised in this vicinity; quality fully up to an average. *Marquette*: Spring wheat has done the best. *Saginaw*: An increase of about 25 per cent. in acreage, but product about the same as in 1877. *Wexford*: The acreage much in excess of last year; yield per acre much less. *Montcalm*: Well-cultivated lands in many cases average 35 to 45 bushels; one field of five acres averaged 65 bushels.

INDIANA.—*Decatur*: The best crop in this county since 1868; grain plump and well developed. *Hamilton*: Will average very near 20 bushels per acre. *Whitley*: An increased

acreage, but yield perhaps a little less per acre than last year; quality good. *Tipppecanoe*: Unusually good yield, 16 to 40 bushels per acre. *Starke*: Injured by rust; season wet.

ILLINOIS.—*Tazewell*: Largest yield for years, and quality No. 1. *Clark*: The crop falls a little short of former estimates in some parts of the county, and in others it overruns. Will be an average. *DeKalb*: Crop very well matured. *Edwards*: Crop saved in good condition. *Hardin*: Owing to rust average not over 4 bushels per acre. *Vermillion*: Winter wheat very fine: average 18 to 20 bushels per acre; weight over 60 pounds per bushel. *Pike*: The quality was never better. *Lee*: The prospect was about an average, but the quality is very inferior. *Carroll*: Winter wheat good; spring inferior. *Clinton*: Injured by weevil after cutting. *Ogle*: Winter wheat good, but acreage small; spring wheat, an increased acreage, but crop light. *Winnebago*: There will be no surplus; last year not enough for home consumption. *Boone*: Product much larger this year than in 1877, owing to a greatly-increased acreage; scarcely any sown in 1877. *Mason*: The yield of fall wheat good, but spring wheat very poor. *Montgomery*: Grain plump and of first quality, but yield not more than 18 bushels per acre; Fultz takes the lead; the Silver Chaff seems to be a failure. *Jefferson*: No bad wheat; weight 63 to 65 pounds per bushel. *McLean*: Better than expected. *Moultrie*: Quality good; weight 61 to 66 pounds per bushel. *Hamilton*: The yield of winter wheat below expectations, but an increase of 50 per cent. in area, and quality good. *Greene*: Winter wheat No. 2, and worth 80 cents per bushel. *La Salle*: Winter sowing on the increase; its product 150 per cent. of last year; its quality only 90. *Union*: Winter wheat our staple; yield average, but quality inferior.

WISCONSIN.—*Fond du Lac*: Wheat grades 3, 4, and rejected. *Waukesha*: Spring wheat injured by one hot week; product of winter wheat about 125; average quality about 100. *Douglas*: Has not equalled expectations, owing to dry, hot weather. *Dunn*: Very uneven; some new lands producing as high as 36 bushels per acre, and on other lands equally as good crop not worth cutting; smut, rust, and blight almost destroying it. *Door*: Spring wheat badly shrunk from drought at time of filling. *Walworth*: Spring wheat cannot be accurately estimated, owing to the variance of yield and quality reported. Fall wheat a full yield and good quality. *Jefferson*: Quality poor on account of grain being badly shrunk by hot weather of July. *Dodge*: Light; 40 to 56 pounds per measured bushel. *Washington*: Winter wheat a splendid crop, but not extensively sown; average about 30 bushels per acre; spring wheat grades No. 3, and is only half a crop; both crops together about 85. *Chippewa*: Yield small, quality poor, and price low. *Grant*: About as many bushels of spring wheat as last year, but the sample poor. *Trempealeau*: Quality very poor; straw killed and grain shrunk by hot sun of July. *Calumet*: Average yield 15 bushels per acre. *Adams*: Average yield of spring wheat not exceeding 6 or 7 bushels per acre; winter wheat 15 to 25 bushels; increased acreage of both. The aggregate product will be up to that of last year. *Sauk*: Winter wheat but little raised; yield and quality good; an average of about 35 bushels per acre. *Monroe*: Spring wheat not a half crop; winter wheat much better; taken together about three-fourths of an average. *Rock*: Winter wheat good, averaging 30 bushels; spring wheat injured by chinch bugs.

MINNESOTA.—*Faribault*: Badly blighted; worth from 25 to 50 cents per bushel. *McLeod*: Straw very heavy, yielding from 15 to 20 bushels per acre. *Rock*: Much wheat not cut; grading 3 and 4. *Redwood*: A greater acreage but lighter grain than last year; badly shrunk by being ripened too quickly. *Le Sueur*: Has proved to be poorer in quality than quantity. *Olmstead*: Will not average No. 3 in this county. *Pope*: Yield larger than anticipated; some yielding from 20 to 28 bushels per acre, but mostly of inferior quality; excessive heat caused an overgrowth, too sudden ripening, and shrinkage. *Sibley*: The product No. 2 and 3. *Scott*: Paralyzed by excessive heat while in the dough state; kernel shrunk; the average grade will be No. 3. *Wadena*: Grades No. 1, and makes a superior quality of flour, but grain about 4 pounds per bushel lighter than last year. *Skeels*: The quality variable, selling for about one-third less than No. 1 wheat. *Hennepin*: A larger area and greater product than last year, but deficient in quality. *Goodhue*: Rapid and premature ripening; many fields overripe before secured. *Jackson*: Hot weather of July very injurious to the crop; quality inferior; average grade No. 3. *Stearns*: About two-thirds of the crop grades as No. 2, one-sixth as

No. 1, and balance No. 3. *Becker*: Yield from 8 to 25 bushels per acre. *Dodge*: Poorest crop ever raised here; grain shrunken and light. *Wright*: But little No. 1 wheat raised this year. *Yellow Medicine*: Spring wheat large yield, but poor quality; excessive heat.

IOWA.—*Mitchell*: Yielding about 10 bushels of rejected wheat, some grading as high as Nos. 3 and 4. *Wayne*: A good crop. *Hardin*: Very poor; average about 6 to 8 bushels per acre. *Howard*: Damaged in the stack by recent rains. *Pottawattamie*: Product and acreage increased. *Floyd*: Yielding from 5 to 14 bushels per acre, grading rejected; but a small portion of the crop in this county will pay for harvesting. *Allamakee*: "Lost Nation" yielding about 5 bushels per acre of light, shrunken grain; unmarketable for more than 25 or 30 cents per bushel; "Red Odessa" yielding from 8 to 10 bushels of fair quality. *Marion*: Will mostly grade Nos. 2 and 3. *Cherokee*: Yields from 10 to 20 bushels per acre. *Franklin*: Spring wheat almost ruined by heat in July; some not harvested; some harvested that will not pay for thrashing. *Polk*: Almost a failure throughout the county, averaging from 3 to 14 bushels per acre, generally of very poor quality. *Muscatine*: Grades mostly at No. 2. *O'Brien*: Grades low on account of rust; price low. *Plymouth*: Very poor; grades mostly No. 3.

MISSOURI.—*Clay*: Turning out fine in both quantity and quality. *Maries*: Quality better than an average, but yield only about 9 bushels per acre. *Adair*: A larger crop than last year, and about 10 per cent. better quality. *Benton*: A poor yield, but quality very good. *Holt*: The quality of wheat crop reduced by poor spring wheat; spring wheat about 7 bushels per acre; fall wheat as high as 35 bushels per acre. *Cass*: The average will not exceed 14 bushels per acre, but the quality the best ever produced in the county. *Iron*: The quality better than for years, but the yield in many instances one-fourth of a crop. *Jefferson*: Yield and berry both poor in some places. *Warren*: An excess of at least 20 per cent. over last year. *Johnson*: The quality of winter wheat seldom better than this year; yield about 14 bushels per acre. *Osage*: The Fultz the only wheat in the county making a fair average. *Caldwell*: Crop less than expected at harvest. *Saint Louis*: Injured by cool, damp spring weather. *Perry*: Falls short of last crop, with inferior quality.

KANSAS.—*Cloud*: Yield of winter wheat unusually large in some localities. As high as 40 bushels per acre reported, and quality fine. *Saline*: Spring wheat 30 per cent. below the crop of last year. *Chase*: A large increase over last year; will average 25 bushels per acre. *Labette*: The best berry for ten years. *Nemaha*: Spring wheat product light.

NEBRASKA.—*Platte*: A greater acreage, but owing to excessive heat at time of filling, causing blight and shrinkage, the quality of grain is not up to last year. *Saunders*: Light in weight, colored, and shrunken; yield from 5 to 26½ bushels per acre. *Hamilton*: Much of the crop yielding less than estimated. *Knox*: Weight light; average 56 pounds per bushel.

CALIFORNIA.—*Placer*: Berry good and plump, but yield 33 per cent. short, owing to late rains causing foul growth. *Sonoma*: Nearly ruined by heavy rains last winter, but damage thought to be local.

OREGON.—*Lane*: Much better than last year. *Douglas*: With but few exceptions is below an average yield, but quality very superior.

UTAH.—*Kane*: Good, but injured in some parts by rain.

DAKOTA.—*Grant*: The average reduced from 21 bushels to 17 bushels, by drought after June 1. *Hanson*: Product large, but quality inferior. But little of this year's crop will grade No. 1.

NEW MEXICO.—*Santa Fé*: A portion of the crop still unharvested owing to excessive rains in August and September. *Mora*: Considerably injured by late rains, causing the wheat to sprout and shrink.

CORN.

The corn season closed with a marked improvement in the condition of the crop. The condition returned October 1 was 96, not quite so high as October, 1877. The acreage, as found by June returns, showed no material change, being, in round numbers, 51,000,000 acres in 1878 and 50,300,000 acres for

1877. Compared with 1877, the South Atlantic States show a falling off in product; the Gulf States increase slightly; the States of Kentucky, Illinois, Missouri, and Kansas—four of the largest producing States—decline considerably; while all the other States north of the Ohio River and in the Northwest make a decided increase, thus making the aggregate of the crop for 1878 larger than that of 1877 some 30,000,000 bushels. This result is the more remarkable as it is the fourth of an unbroken series of large crops.

The following notes from our reports are appended :

MAINE.—*Cumberland*: Two farmers raised from 86½ to 99½ bushels, shelled, per acre.

NEW YORK.—*Genesee*: Finest crop for several years. *Saint Lawrence*: General condition slightly below 100. *Westchester*: Has not eared well. *Albany*: Better than indicated in August. *Fulton*: Fine crop and all harvested.

NEW JERSEY.—*Burlington*: Smaller crop than was anticipated; started slowly from unfavorable spring, yet general condition fair. *Camden*: Good average crop. *Warren*: Yield low, but quality good.

PENNSYLVANIA.—*Armstrong*: Below average owing to extreme heat of July and drought of August; ears poorly filled. *Beaver*: Injured by excessive hot weather. *Montour*: Continued dry weather has made ears small and affected the yield of fodder. *Perry*: Materially affected by drought. *York*: The great reduction in yield is due to cold weather at planting, succeeded by drought. *Clearfield*: In some sections the crop is good, but on the whole it will not exceed 50 per cent. of an average. *Elk*: Generally a good crop, particularly on high land. *Indiana*: Cut short by drought during August and September; quality good, but yield very low. *Erie*: One-fourth better than last year, well ripened and secured earlier. *Tioga*: Did well in some parts of the county, but on clay or low ground the cold, wet weather of May and June injured its general condition. *Lycoming*: Owing to cold wet weather at planting the growth is thin and the average below last year's figures.

MARYLAND.—*Washington*: Turning out better than was anticipated; pretty fair crop. *Montgomery*: Latter part of season favorable, product large, and quality about an average. *Frederick*: Somewhat damaged by drought; quality seems good; will gather this month. *Worcester*: Affected by drought; short crop.

VIRGINIA.—*Fluvanna*: Very fine; favorable season. *Henrico*: Both product and quality above an average. *Mecklenburg*: Improved by late summer rains, but both yield and quality less than last season. *Spottsylvania*: Superior crop generally. *York*: Very short on account of drought. *Northampton*: Smallest crop for years, drought the cause. *Elizabeth City*: Larger yield than was anticipated in previous report, but quality inferior to that of 1877. *Princess Anne*: Seriously affected by excessive rains in the spring, and in bottom lands entirely destroyed. *King and Queen*: Very good crop. *Prince Edward*: Nearly all crops on water-courses destroyed by freshets; those out of reach of high water, equal to last year. *Floyd*: Greatly damaged by severe storm and freshet on the 16th September. *Halifax*: Product shortened by drought, but quality good. *Campbell*: Is measuring up better than was expected. *Orange*: The crop is about equal to that of last year. *Dinwiddie*: Fully as good as last season. *Gloucester*: Cut short by drought in early part of season. *Highland*: Late favorable weather has improved general condition.

NORTH CAROLINA.—*Cleveland*: Suffered seriously from drought. *Gaston*: Improved by September rains; slightly below an average. *Hertford*: Good in some sections of the county. *Greene*: Injured by drought on the uplands. *Alamance*: Not more than two-thirds of a full crop. *Burke*: The upland crop cut short by drought.

SOUTH CAROLINA.—*Clarendon*: Fine crop; very well matured and heavy. *Lexington*: Below an average, a portion of the county having suffered from drought. *Haywood*: Not much below an average; last year was far above. *Orangeburg*: Less planted this year than last, but better crop.

GEORGIA.—*Brooks*: Good; has turned out better than was expected before gathering. *Dooley*: The finest yield since the war. *Fannin*: Only about three-fourths of a crop, owing

to drought and the depredations of worms and caterpillars. *Jones*: Fine generally. *Towns*: Does not realize what was anticipated. *Worth*: All fallen off. *Jefferson*: Above an average, and greater than last year. *Floyd*: Damaged by drought. *Troup*: Cut short by continued hot weather in the summer. *Carroll*: Badly affected by drought. *Wilkes*: Good, and well filled to tips of ears; late crops generally a failure; would have been very heavy had they matured.

ALABAMA.—*Baldwin*: Except the very early planted, the crop was nearly a failure, from various causes. *Clarke*: A large increase of acreage this year; early planted very fine, late shortened by July drought. *Crenshaw*: Above an average yield and of good quality; very little rotted. *Dale*: The best crop for years. *Calhoun*: Hot weather has lessened the yield and affected the quality. *Coffee*: Very fine; selling at 50 cents per bushel.

MISSISSIPPI.—*Grenada*: Full average in both quantity and quality. *Wilkinson*: Favorable season for harvesting, and the ears are larger and less affected by rot than for years. *Choctaw*: Much has rotted in the fields. *Jefferson*: Not so large a yield, but decidedly of better quality than last season.

LOUISIANA.—*Bienville*: Excessive rain during the spring and summer has caused the crop to fall short of that of last year.

TEXAS.—*Coryell*: Did not yield as well as anticipated for want of rain, plenty for home use, selling at 25 cents per bushel. *Dallas*: Probably the best crop raised for years. *Hardin*: More rotten than usual, caused by excessive wet weather while maturing. *Kendall*: Large yield, at 30 cents per bushel, the cheapest ever known. *Liberty*: Very good. *Titus*: Yield good, but premature ripening has reduced the quality. *Young*: Early planted, splendid yield and good quality. *Austin*: Badly rotted in consequence of frequent rains while ripening; general average slightly below last year. *Williamson*: Yield good; quality injured by weevil; acreage 25 per cent. greater than last year. *Cherokee*: Badly damaged in field by weevil. *Victoria*: I find it necessary to reduce the average from last month's report to but 50. *Upshur*: Yield is 10 per cent. greater and quality 20 per cent. better than last year. *Red River*: Injured by too much rain. *Bastrop*: Much lighter and the yield less than was anticipated a few weeks ago. *Bexar*: Unusually good crop; selling at 30 cents per bushel. *Fayette*: Affected by drought, which has been favorable to the attack of weevil, injuring the grain, especially on sandy soil.

ARKANSAS.—*Baxter*: Cut short by six weeks' drought. *Woodruff*: Ears lighter than last year, with heavy husk. *Marion*: Very good. *White*: Light on the lowlands on account of heavy rains during the summer. *Franklin*: Full in both product and quality. *Marion*: Not so good as last year.

TENNESSEE.—*Henderson*: Yield very small and quality inferior; poorest crop for years; dry weather the leading cause. *Fayette*: Injured very much by drought during July and August. *Greene*: Affected by drought in north of county. *Henry*: Very short crop. *Roane*: Has turned out better than was anticipated before gathering. *Henderson*: Early expectations have not been realized; yield considerably below an average. Many fields look well, but upon close inspection the ears are found to be badly filled, while there is an abundance of husk. *Robertson*: Overestimated in quantity. *Putnam*: Is turning out not so good as was hoped; drought of June and July caused it to be chaffy. *Montgomery*: Not yet gathered, but estimated about 20 per cent. greater than last year.

WEST VIRGINIA.—*Morgan*: Reduced to a half crop or less by a very dry, hot summer. *Raleigh*: Rather short. *Jefferson*: Maturing finely. *Braxton*: A little above average in product and quality. *Pendleton*: Above an average yield and very good in quality. *Doddridge*: Injured by drought in June and July, but fall favorable for curing it.

KENTUCKY.—*Cumberland*: Light and short, not as good as expected some weeks ago. *Lewis*: Crop short on account of drought. *Warren*: Fully up to average in quality; fall favorable for maturing the crop. *Crittenden*: Crop very short, owing to excessively dry weather at the time of latter growth and filling of the ear. *Nicholas*: A fair crop in the northeastern portion of the county, but very light in other sections, owing to drought. *Carroll*: The average yield much less than expected during the summer. *Graves*: Corn scarce and low in price—bound to rise ere long. *Harrison*: The season was unfavorable for growing

corn, and the crop is uneven. Some fields will yield 60 bushels per acre, while others will not exceed 10 or 15 bushels. *Scott*: Cut short by drought during the summer.

OHIO.—*Medina*: Less planted than last year, but yield and quality equal. *Miami*: Above an average and ready to crib. *Montgomery*: Frost late and corn all ripened well. *Seneca*: Slow in curing, with damp cob; cribbed later than usual by several weeks. *Vinton*: A short crop, caused by drought in August. *Perry*: Crop abundant, and quality good. *Ashtabula*: A greater breadth planted than last year, but product only about the same, and quality not so good. *Geauga*: Superior in quantity and quality to any crop for several years; weather favorable for ripening it. *Lorain*: Well matured, and but for wind storms in September, the crop would be enormous. *Pickaway*: On good lands a larger yield than last year; quality superior. *Tuscarawas*: Corn crop affected by dry weather in July. *Noble*: Of good quality except where injured by flood. *Hancock*: Corn abundant and worth about 28 cents per bushel. *Morrow*: Affected in growth and ripening by wet weather; fodder mostly dead before frost came and of little value. *Preble*: Neither quantity nor quality as good as expected on October 1. *Scioto*: Over 2,000 acres of the best corn in the county destroyed by the overflow of the Scioto River in August; about two-thirds of an average crop.

MICHIGAN.—*Calhoun*: Growth and cultivation retarded by extremely wet weather early in the season. *Hillsdale*: Thought to be rather light, but may come up to an average. *Tuscola*: Has proven to be a very fine crop, but a decreased acreage. *Charlevoix*: Yield lessened by drought, but quality good. *Newaygo*: Yielding from 125 to 130 bushels of ears per acre, the largest and best crop raised for several years.

INDIANA.—*Wabash*: Good growing weather and the late appearance of frost have brought all late corn to a good average. *Decatur*: Crop short, owing to late spring, insufficient cultivation, and storms. *Howard*: All late corn fully matured. *Noble*: Short. Weather too dry at the time of earing. *Shelby*: Light and chaffy. *Whitley*: Has matured well, but product reduced by wet weather and bad cultivation early in the season. *Hendricks*: Never finer weather for ripening. *Marion*: Not yielding as expected, and light and chaffy. *Warren*: Good in quality but short in quantity. *Knax*: Yield reduced by drought. *Noble*: Crop not as good as expected, owing to dry weather at the time of earing; ears sound but short. *Tippecanoe*: Quality better than last year, and on the best farms will yield from 60 to 75 bushels per acre. *Gibson*: Generally gathered in good condition and is in but little demand. *Hendricks*: But little corn to sell, as the county is full of hogs; corn will be 50 cents per bushel before July next. *Jasper*: Quality uneven; some good, and some light and shrunken. *Marion*: Late in drying sufficiently to crib; about three-fourths under shelter or gone to market. *Starke*: Not good on lowlands owing to wet season, but an increased yield on highlands.

ILLINOIS.—*Bond*: Crop short from drought. *Bureau*: Not as good as expected two months ago; injured by being lodged; much of it loose on the cob. *Carroll*: About one-half in the crib; worth 20 cents per 75 pounds in the ear. *Clark*: Quality good, but only about three-fourths of an average crop. *Edgar*: In the spring ground cloddy and in poor condition for corn. *Hancock*: Matured in the best possible manner. *Hardin*: Crop fair and of good quality. *Jackson*: Very good and well matured. *Kankakee*: Rather short in acreage, much being drowned out; an average in quality. *Lawrence*: A wet spring and a very dry August caused a poor corn crop. *Sangamon*: Has been an excellent fall for ripening corn. *White*: Have not had a full crop for four years; this year about half a crop. *Livingston*: Wet spring and late planting has produced much soft and light corn. *Pike*: Sound and better than expected. *Mason*: A light crop; shrinkage caused by high winds during the summer months. *Ogle*: A good average crop and well matured. *Adams*: A poor showing compared with last year. But little corn planted until June, and had not time to mature. *Logan*: Yield much lighter than expected, but quality good, and in fine order for husking. *Macoupin*: Being cribbed and yielding better than was expected. *Tazewell*: Injured by heavy rains during the working season, and was blown down while curing. *La Salle*: Very favorable weather for maturing, but an unfavorable spring, and most bottom lands drowned out. *Morgan*: Damaged by cold rains in May and June and by drought and "corn worm" in July. *Boone*: At least three-fourths husked and in good order.

WISCONSIN.—*Dunn*: Crop never better, some fields yielding as high as 100 bushels of ears per acre. *Richland*: Good, and about half gathered. *Watworth*: Very uneven; eastern parts light and not of good quality; in the western portion of the county, heavy and of good quality. *Adams*: Injured by rain; many fields inundated for a week at a time. *Green*: The crop was never better; many fields will average 60 bushels per acre. *Waukesha*: Damaged by drought between July and September.

MINNESOTA.—*Ramsey*: The best corn year for many years. *Isanti*: Crop good all over the county, and area larger than usual. *Meeker*: A full and very good crop. *Jackson*: Not as much planted as last year, but the quality was never better. *Polk*: As yet an experiment in this county. Badly cut by frost this year. *Nobles*: Product equal to that of last year, and a smaller acreage. *Rock*: Corn sound and 10 per cent. above that of last year. *Sherburne*: The present crop one of the best ever raised in the county. *Stearns*: Product about 115 this year, without allowing for the destruction of last year's crop by grasshoppers. *Todd*: Corn crop the best for eight or ten years. *Martin*: Becoming a leading crop, and with early planting and good care proves profitable. *Kandiyohe*: An early spring and warm summer have produced the best corn crop ever grown here. *Faribault*: Corn is a good crop. *Polk*: An early frost came very near spoiling the entire crop. *Steele*: A larger average yield than at any time since the settlement of the county.

IOWA.—*Allamakee*: Not good on low lands, and the yield not coming up to previous estimates. *Louisa*: Well matured before frost came, but injured to some extent by storms and worms. *Delaware*: Backward in the spring, but weather favorable for maturing. Of good quality, but yield less than expected. *Polk*: The crop has neither the weight nor the bulk of last year, but is dry and well matured. *Johnson*: About equal in quantity to last year, and greatly superior in quality. *Montgomery*: Cut short by dry weather. *Guthrie*: Yield much less than was expected. *Howard*: Well ripened; ears large and well filled. *Franklin*: Not as heavy as estimated some time ago; shrunken and loose on the cob. *Mitchell*: Product short on account of poor seed and gophers; quality better than last year. *Lucas*: Sound, dry, and of very superior quality. *Kossuth*: A small stand, owing to poor seed and wet spring, but quality No. 1. *Linn*: Corn has gone into the crib dry and sound. *Madison*: All gathered; quality excellent, but yield light. *Muscatine*: A good yield, and of excellent quality. *Shelby*: Crop shortened by drought of three months, but the quality unusually good. *Story*: Cut short at least one-third by severe heat in July.

MISSOURI.—*Benton*: Too hot and dry; crop short. *Chariton*: An average yield, and drying out well. *Jefferson*: Not as heavy and good as last year, but will yield a little above an average. *Lawrence*: Not good as expected; late corn somewhat chaffy, owing to heat and drought in August. *Butler*: Early prospect good, but having no rain in July and August the crop is short. *Phelps*: A decline in acreage and injury by drought. *Polk*: Very light, on account of excessive drought late in the season. *Caldwell*: Quality very good, and being gathered in the best possible condition. *Carroll*: The early excessive rains and drought in the latter part of the season were against corn; not yielding as expected. *Adair*: Good in quality, but product not equal to last year. *Maries*: Damaged to some extent by flood on low land, and not good on upland. *Newton*: On dry land a good crop and sound corn, but on wet land very light. *Pemiscot*: Too wet for corn; it could not get the cultivation it required. *Caldwell*: Harvested in most excellent condition. *New Madrid*: Did not turn out as well as the appearance of the fields indicated. *Saint Louis*: Cut short by drought; almost an entire failure in some localities. *Carroll*: Not yielding as much as expected; some fields an entire failure; others extra good, producing from 60 to 75 bushels per acre; some old fields entirely destroyed by wire-worms. *Laclede*: Injured by extreme drought in July and August.

KANSAS.—*Marion*: Ears short and rather loose on the cob, and not yielding as well as expected. *Douglas*: Crop only about three-fourths as good as last year; a large proportion of moldy ears, with tight, dried husks and rotten cob; all fields alike in this regard. *Montgomery*: Acreage the same, but yield one-fourth less than last year; caused by drought. *Cowley*: Yielding well. *Labette*: Only three-fourths of a crop. *Washington*: Drier than on the

1st of December last year, and quality very good. *Reno*: Extra good on uplands where well cultivated, but badly drowned out on bottom-lands.

NEBRASKA.—*Dodge*: Acreage considerably less than last year. *Hamilton*: Crop seriously injured by hot winds and absence of rain at time of maturing. *Knox*: Some of the finest corn grew on this year's breaking. *Nuckolls*: A less area planted, and yield not so good as last year; a reduced product on account of a large planting on sod land. *Nemaha*: Never so much corn in the crib at this date, nor in such fine condition. *Saunders*: Dry enough to crib on October 1; yield ranging from 5 to 50 bushels per acre.

CALIFORNIA.—*Contra Costa*: Corn excellent and double acreage planted. *Humboldt*: But little corn raised, except the early kinds for table use. Pease are grown in place of corn for hog feed; they yield one and a half tons per acre.

NEW MEXICO.—*Moro*: The last two crops very poor; nights are too cold to produce corn, but it is planted to get rotation of crops. *San Miguel*: Nearly all destroyed in the southern part of this county by worm in the ear; the crop excellent in the northern part of the county.

DAKOTA.—*Hanson*: Average low on account of being late-planted on newly-broken land.

COTTON.

The December returns to this department, relating to the cotton crop, close our inquiries from the different counties and correspondents, and enable us to make quite an accurate computation as to the crop of 1878.

The increase of acreage, as ascertained by this department last spring, amounted in the whole area to less than 2 per cent., viz, 12,056,855 acres in 1877 and 12,266,785 acres in 1878, an increase not large enough to materially affect the crop.

The Fall returns of condition were 90, fully equaling that of the year 1870, and excelling any intervening year. Insect injuries were not reported to any great extent, except in portions of Alabama, Mississippi, and Georgia.

The increase of yield is very decided, being 191 pounds of lint for the year 1878 against 180 pounds for 1877; this great increase is mainly caused by the favorable weather which has lasted to date, and the large yield in the States of Texas, Arkansas, and Tennessee.

Estimating a bale of cotton to weigh 450 pounds of lint, which is near the average of all bales received at Liverpool during five years, and not at 460 pounds, the weight calculated in this department last year, we find the crop will be, in round numbers, 5,200,000 bales.

The following extracts from correspondents are given:

NORTH CAROLINA.—*Greene*: Early-planted yielded well. *Cabarrus*: No frost; cotton maturing prosperously. *Cleveland*: Crop matured at least twenty days earlier this season than usual; fall favorable for gathering, and lint very fine and fiber strong; less fly-wart than usual. *Gaston*: Everything favorable to cotton, the fruitfulness of which is a subject of common remark; product very large for this Piedmont country and latitude. *Hertford*: Crop short; injured by cold rains in spring and early summer, drought in July and August, followed by floods in September. *Mecklenburg*: Will equal last year; three weeks earlier, and at least half the crop is in the market and sold. *Rowan*: Frost one week later than usual. *Wilson*: Frost has caught much of the top crop, which will be inferior; low prices cause much depression among farmers.

SOUTH CAROLINA.—*Fairfield*: The past month has been favorable for maturing and packing, which has advanced the yield prospects. *Greenville*: Crop maturing early, so much so that nearly all will be gathered by November 15. *Clarendon*: At least 30 per cent. less than

last year; blight and rust, and to some extent worms, have caused the reduction; two-thirds of crop already in market. *Newberry*: The late season has increased the yield on clay lands. *Oconee*: Lint not so good as last year. *Lexington*: Frost nipped the second growth. *Union*: Has improved since last report. *Laurens*: Killing frost on October 31; crop 15 per cent. better than appearances indicated October 1. *Horry*: Much better average yield than expected; picking has been good. *Orangeburg*: The middle crop almost an entire failure; some farmers have made a bale of 450 pounds to the acre, while in other sections it will take four and even six acres to make a bale.

GEORGIA.—*Brooks*: Cotton improved during the entire picking season, and at this time nearly the entire crop is housed, and two-thirds of it sold. *Dooly*: A poor crop; rust and caterpillars did the work. *Jasper*: Nearly out; lint fine. *Jones*: About same as last year in pounds; quality a little better than last year. *Laurens*: Fine top crop where it has escaped caterpillars. *Worth*: Cut off by the worm. *Wilcox*: Most all housed. *McDuffie*: Killing frost on the 19th of October; the month has been a delightful one for gathering; four-fifths of the crop has been gathered. *Wilkes*: White frosts on mornings of November 1 and 2; what the late crop will do depends on the weather; soft bolls frozen, and much cotton on the ground owing to high winds. *Hart*: Turned out better than expected, and will make a better crop here than has been reported. *Carroll*: Weather fine, and nearly all the crop gathered in good condition. *Pulaski*: Better than last year, but poor; four-fifths of crop gathered. *Troup*: The increased acreage and free use of fertilizers may increase the aggregate of the crop. *Stewart*: Favorable weather for picking; 90 per cent. already gathered, and balance will be picked this month.

FLORIDA.—*Hillsborough*: About the first of the month the caterpillar made its appearance and cut off the crop; there will be no other picking than the one now making. *Leon*: Season earlier, better, and more uniform than for years; not more than one-eighth of the crop to gather. *La Fayette*: Caterpillars nearly cleaned the fields, and what was left was injured by a storm.

ALABAMA.—*Baldwin*: Stripped by caterpillars, but made a fine quality. Weather unusually fine for picking. *Clarke*: About same crop as last year. *Crenshaw*: Above average, and of first quality; worms failed to do much damage only on some very late cotton. *Dale*: The best for years. *Calhoun*: Has turned out well, owing to a favorable fall. *De Kalb*: Cotton is pretty well gathered where health permitted; above average product, but lint not as good as last year; frost on the 19th (three weeks earlier than 1877). *Bullock*: Fall unusually favorable for gathering, thus counterbalancing the damage done by rust and caterpillar.

MISSISSIPPI.—*Grenada*: Picking commenced two weeks earlier than usual, yet much loss in value and bulk will grow out of the delay in picking, owing to yellow fever among the pickers. *Wilkinson*: Season good for picking; quality superior, as good as any I have ever seen, if not better, none classing below middling. *Attala*: Bottom crop shortened by falling off; middle crop injured by boll-worm; top crop good. *Choctaw*: Injured by wet weather, boll-worm, and the caterpillar. *Jefferson*: Poor; most of it picked, and quality better than last year; frost and ice. *Tallahatchee*: Gathering greatly retarded by the yellow fever; fever now abating, and crop being rapidly gathered. *Yazoo*: Greatly improved in last thirty days, owing to absence of frost and full development of top crop. *Noxubee*: Seven-eighths of the crop has been gathered. *Chickasaw*: Less than anticipated; damaged by rain, boll-worm, and caterpillar. One planter cultivated 75 acres of bottom land, and will not get over two bales off the entire tract; last year about 1,500 pounds of seed-cotton made a 500-pound bale; this year it will take 1,800 pounds.

LOUISIANA.—*Saint John Baptist*: Fine weather for gathering will greatly increase the crop above what we expected. *Bossier*: Injured very much by the caterpillar. *Bienville*: A short dry spell in August, with the appearance of the destructive boll-worm, followed quickly by the caterpillar—which seemed to be more destructive than ever for the short time at work—has caused the cotton-crop to fall far short of what it promised. *Caddo*: Picking is over; it takes 2,000 pounds of seed-cotton to make a bale of 500 pounds.

TEXAS.—*Coryell*: Cut short by protracted dry weather. *Dallas*: Quality fine and greater part of crop gathered and brought to market unusually early. *Hardin*: Very little planted;

matured well and lint good. *Kendall*: A bale to the acre will be easily realized; trouble to provide pickers. *Liberty*: Cut short by rains and a late worm. *Matagorda*: Ranges in yield from one-half to one-fifth of a bale per acre. *Somerville*: Unusually good for picking; lint nice and sound, and about 75 per cent. saved. *Titus*: Staple coarse and short; seed unusually heavy. *Trinity*: Picking still continues; plants heavily fruited and some still growing. *Washington*: The lint will average over one-half bale per acre, and the product for the county will be greater than last year. *Austin*: Much remains in the field, owing to low price; farmers are having it picked for half the crop. *Williamson*: Nearly all saved in good condition; weather favorable and quality good; *Cherokee*: A late fall and no frost has brought the crop up at least 10 per cent. in the last month. *Waller*: Yielded better than the most careful observer expected. *Upshur*: Same in seed cotton as last year, but not so much lint. *Red River*: Fall favorable; no killing frost as yet. *Bastrop*: Nearly all saved; yield fine and lint good; largest crop that has ever been raised in this county. *Bexar*: All saved in good condition. *Fayette*: Fall favorable. *McLennan*: Have never known so little of the crop to be lost; farmers have generally been able to save it all, and in fine condition. *Burleson*: Heaviest crop ever made in the county; nearly all gathered. *Madison*: Decidedly the best crop ever raised in this county; being rapidly gathered and staple fine. *Nacogdoches*: Beautiful weather for gathering; no frost yet.

ARKANSAS.—*Woodruff*: Having been injured by rust, is not yielding as well as was anticipated. *Independence*: Heavy frost on the 28th ultimo; late season has made yield and quality better; bulk of crop gathered. *Marion*: Fair quality; opening early, and weather fine for picking. *White*: A heavy black frost on the 19th of October killed all the green vegetation. *Johnson*: Weather favorable; quality clean and nice. *Franklin*: Fall favorable, and over one-half the crop gathered; cut short in some places by the boll-worm. *Howard*: Two-thirds gathered, and much better than was promised in September. *Marion*: Bulk of crop picked in fine condition. *Stone*: Boll-worm damaged the crop materially. *Draw*: First killing frost on 18th and 19th of October.

TENNESSEE.—*Fayette*: Cotton damaged by rust and drought. *Henry*: Good. *Henderson*: Favorable fall for cotton; complaint of short lint. *Putnam*: Cotton good and turning out well; quality fine.

OATS.

The oats crop is somewhat in excess of the very large crop of 1877, constituting it the largest crop ever raised in this country. The rate of increase, however, is less than that of the acreage, showing that the average yield per acre, on the whole, is somewhat less than last year. The Atlantic slope, north of the Chesapeake, showed a decline, especially in the large oats-producing regions of the Middle States. The southern coast States, from North Carolina to Texas, uniformly increase their product, but the southern inland States, as a whole, fell off. The West, Northwest, and Pacific States showed a marked increase. The Territories also indicate an enlarged product.

The quality of the grain in most of the States is inferior, only Vermont, Massachusetts, Rhode Island, Connecticut, Alabama, Tennessee, Kentucky, Illinois, Missouri, and Kansas reporting a full average. The minimum quality appears in the neighborhood of Chesapeake Bay, though portions of the Northwest also note a marked deficiency of weight and other merchantable qualities.

MAINE.—*Oxford*: Light crop, owing to drought.

NEW HAMPSHIRE.—*Hillsboro*: Nearly all fed to milch cows.

VERMONT.—*Caladonia*: Very fine, better than last year. *Grand Isle*: Nearly ruined by June drought and July rains. *Addison*: Crop light and inferior.

NEW YORK.—*Albany*: Not so good generally as last year. *Cattaraugus*: Slight falling off in yield per acre. *Montgomery*: Yield greatly reduced by dropping from stalk. *Genesee*: Yield less than was expected.

NEW JERSEY.—*Warren*: Yield and quality inferior, but good growth of straw.

PENNSYLVANIA.—*Bedford*: Good yield of straw. *Tioga*: General condition good. *Elk*: An enormous growth of straw, but only an ordinary yield of grain. *Beaver*: Affected by dry weather; will not weigh 33 pounds per bushel. *Westmoreland*: Drought; yield varies in sections, general condition fair. *Butler*: Affected by dry weather in June, weight light. *Venango*: Very light yield of grain, but good growth of straw. *Indiana*: Yield better than last year with the same acreage. *Monroe*: Light. *Butler*: Light weight. *Bucks*: Small yield and light weight; not over 25 pounds per bushel on an average. *Sullivan*: Average.

MARYLAND.—*Prince George's*: Yield small and quality inferior. *Wicomico*: But for drought this crop would have been the largest on record. *Queen Anne*: Badly beaten down by storms.

VIRGINIA.—*Prince Edward*: Growth of straw very good, but yield in grain, owing to rust, 25 per cent. less than last year. *Campbell*: Full average crop of good quality. *Orange*: Seeded unusually well, and quality superior. *Loudoun*: Both quantity and quality below average; a good growth of straw, but grain light and chaffy. *Madison*: Of fair quality, but yield inferior. *Chesterfield*: Injured by rust in sections, but generally good. *Henrico*: Average yield, and quality never better. *Dinwiddie*: Average low. *Gloucester*: Spring oats almost a failure. *James City*: Winter-sown splendid; early spring very fine. *King and Queen*: About equal to last year. *Highland*: Average. *Matthews*: Rusted. *Northampton*: Heavy-strawed and light-headed.

NORTH CAROLINA.—*Person*: About an average. *Jackson*: Twenty-five per cent. above an average crop. *Perquimans*: Failed. *Beaufort*: Area larger than last year, but very inferior crop. *Columbus*: Suffered much from rust. *Nash*: Badly rusted. *Wilkes*: Better than for several years. *Cherokee*: Crops poor for many years. *Gales*: Short. *Stanley*: Short crop; badly sown and not fertilized.

SOUTH CAROLINA.—*Chesterfield*: Cut short by rust. *Fairfield*: Yield about equal to last year, with increased acreage.

GEORGIA.—*Cobb*: About equal to last season. *Jackson*: Very good. *Habersham*: Average. *McDuffie*: Increased acreage.

ALABAMA.—*Barbour*: Unusually fine crop, the red rust-proof variety being almost exclusively sown. *Concehuh*: Very good crop.

MISSISSIPPI.—*Jefferson*: Fine crop, 25 per cent. better than last year, with 25 per cent. increased acreage.

TEXAS.—*Kendall*: Heavy yield and harvested in fine condition. *Red River*: Fair crop. *Rockwall*: Both yield and quality injured by excessive rains. *Burnet*: Increased acreage and product. *Goliad*: Large increase. *Upshur*: Greatly damaged by extremes of heat and moisture. The winter oats sent by the department far exceeds all expectations. *Washington*: The "rust-proof" has done very well.

ARKANSAS.—*Garland*: Injured by rain and rust. *Jefferson*: Very light crop. *Logan*: Increased yield. *Polk*: Good yield.

TENNESSEE.—*Bradley*: Better than for years. *Bledsoe*: Fine crop, not injured by rust; much better than last year; well suited to this soil and climate. *Bedford*: Acreage small, but very fine yield.

WEST VIRGINIA.—*Braxton*: Above an average in product and quality. *Greenbrier*: Damaged in the stack by wet weather.

KENTUCKY.—*Russell*: The crop was never better; the winter oats from the department yield 30 bushels per acre, and weigh 42 pounds per bushel.

OHIO.—*Perry*: Fine yield and quality. *Morrow*: An increase in average yield and acreage. *Erie*: Badly lodged and stacked unbound. *Geauga*: Very heavy; yield from 20 to 50 bushels per acre.

MICHIGAN.—*Newaygo*: The crop short and quality poor; 200 bushels on six acres the best yield seen this year. *Wexford*: Injured by extremely hot weather about the time of heading.

INDIANA.—*De Kalb*: Injured by rust; did not fill well.

ILLINOIS.—*Tazewell*: Largest yield for years and quality No. 1. *De Kalb*: Extremely well matured. *Lee*: A larger area, but yield about the same in pounds as last year. *Mont-*

gomery: Oats fine and better yield than for many years. *McLean*: Was never better. *Moultrie*: Weight 32 to 40 pounds per bushel. *Carroll*: Large yield but light weight.

WISCONSIN.—*Calumet*: Average yield per acre about 35 bushels.

MINNESOTA.—*Rock*: The yield a fair quality, but the crop light. *Redwood*: A large crop and heavy grain, some weighing 41 pounds per bushel. *Pope*: A large yield.

IOWA.—*Mitchell*: Crinkled before filling; very light. *Hardin*: Small yield and light in weight. *Howard*: Weighing lighter than anticipated, yielding from 30 to 40 bushels per acre. *Marion*: A large yield, but much of the grain of inferior quality. *Franklin*: Light; 26 to 30 pounds per bushel. *Polk*: Average low on account of wet, hot season.

MISSOURI.—*Maries*: Very good; weight about 36 pounds per bushel. *Cass*: Not largely sown, but a splendid yield. *Warren*: The best in quality ever raised in the county. *Gentry*: Considerably damaged by rust.

KANSAS.—*Labelle*: Enormous crop.

OREGON.—*Douglas*: Full average in quantity.

DAKOTA.—*Hanson*: Yield fair; quality average.

WYOMING.—*Laramie*: A wonderful yield; some grew 5 feet high.

UTAH.—*Morgan*: About half the crop destroyed by grasshoppers.

BARLEY.

There is no material change in the barley crop for the year 1878 compared with that of 1877, except the great product of California, which will be double that of its predecessor. The large producing States of New York, Wisconsin, and Illinois each show a decrease in number of acres sown and slight decrease in yield per acre, while Michigan, Minnesota, and Kansas show an increase in both acres and yield.

The State of California, which is the largest producing State, increased her acreage from 450,000 acres to 650,000 acres and almost doubled her yield per acre. The total product for this year, 1878, will be, in round numbers, 42,000,000 bushels, while in 1877 the crop was 34,500,000.

The following extracts from correspondence are given:

NEW YORK.—*Genesee*: Very light and poor crop.

PENNSYLVANIA.—*Beaver*: Good yield.

WISCONSIN.—*Fond du Lac*: Barley all discolored. *Dunn*: Badly discolored. *Watworth*: Of average quality and yield. *Jefferson*: Barley marked down because somewhat discolored. *Dodge*: Reasonably plump, but badly discolored; mostly grading as No. 3 or feed. *Calumet*: Average yield 25 bushels per acre.

MINNESOTA.—*Rock*: Injured more or less by rain, and quality inferior. *Redwood*: A most excellent crop; ripened before the heat struck it. *Pope*: The product of barley on the increase. *Wadena*: Has proved the most profitable of the small grains this year.

IOWA.—*Alamakee*: Good yield and grain plump and heavy, but discolored and rejected. *Polk*: Filled before the extremely hot weather, and quality good.

CALIFORNIA.—*Sonoma*: Nearly ruined by the unusually heavy rains of last winter. *Yuba*: Damaged by heavy rains—more than for years; yield greatly reduced. *San Joaquin*: Struck with rust and badly shrunk; also foul with cheat in consequence of very wet weather of past winter. *Stanislaus*: Too much rain last winter, but crop very large. *Tulare*: Double that of last year. *Santa Clara*: Best yield for years.

RYE.

The rye crop turns out about one-sixth larger yield than in 1877. The Atlantic slope, north of the Potomac River, shows an increase of nearly a million bushels. The small crop of the Southern States shows a tendency to decline,

though West Virginia and Tennessee report increased yields. The other sections of the country report increased yields. The total yield amounted to nearly 26,000,000 bushels.

The quality of the crop is below average in New England except Connecticut, and above average in all the Middle States except Delaware. The crop of the South, on the whole, is inferior; while in all the States of the West, Northwest, and Pacific slope the quality is superior, except in Illinois and Nebraska.

BUCKWHEAT.

This crop shows very little change from last year. In many parts of the country there were complaints of injury from the extreme heat and drought.

The following extracts from correspondence are given:

NEW YORK.—*Montgomery*: Full average crop; early sown yielding 20 to 40 bushels per acre, while that seeded late produced 100 bushels and more per acre.

NEW JERSEY.—*Warren*: Good quality, but light yield and poor straw.

PENNSYLVANIA.—*York*: Seriously affected by hot, dry weather. *Indiana*: The most inferior crop we have ever had. *Tioga*: Good in both quality and quantity. *Sullivan*: About average. *Beaver*: Turned out better than was expected.

MARYLAND.—*Montgomery*: Large yield and quality good.

VIRGINIA.—*Spottsylvania*: Favorable season and large crop. *Chesterfield*: The largest crop we have ever raised, and in fine condition.

WEST VIRGINIA.—*Morgan*: Reduced to a half crop or less by summer drought.

OHIO.—*Medina*: Cut short one-half by dry weather. *Vinton*: A short crop, caused by drought in August. *Coshocton*: Many fields entirely ruined by extreme heat in August and September. *Geauga*: A fair crop, but not much grown. *Morrow*: Fine. *Carroll*: Almost ruined by drought.

MICHIGAN.—*Hillsdale*: Did not fill well on account of extremely hot weather. *Chippewa*: Has done finely, and will soon be raised as a general crop. *Emmet*: Nearly an entire failure from drought.

INDIANA.—*Dearborn*: Nearly a complete failure. *Decatur*: Above an average crop. *Orange*: The silver-hulled buckwheat sent by the department an entire failure. *Shelby*: The largest crops yet raised; quality superior.

ILLINOIS.—*Bureau*: Some fields very good; others seem to be blasted. *Clark*: Badly damaged by excessive heat. *White*: Cut off by drought. *Macon*: A failure on account of being largely sown on low land. *Ogle*: Not in favor with farmers, and not much raised. *Winnbago*: Shortened by drought. *De Kalb*: A failure; heat prevented the grain from filling.

WISCONSIN.—*Dunn*: Injured by hot, damp weather of July; yields of 1, 2, and 3 bushels per acre reported, but the bulk of the crop uncut. *Walworth*: Only half a crop. *Waukesha*: Injured by drought. *Brown*: But little that yields over 5 or 6 bushels per acre; injured at flowering time by excessive heat.

MINNESOTA.—*Polk*: The early sown did unusually well; the late sown a total failure. *Houston*: Injured by early frosts. *Redwood*: Light yield; damaged by early frost. *Pope*: Culture increasing and yield good.

IOWA.—*Delaware*: Injured by hot weather, which caused blight. *Polk*: A fine promise, but injured by an early frost. *Montgomery*: Too dry for buckwheat at time of sowing. *Howard*: The cultivation decreasing every year. *Mitchell*: Killed by frost. *Jones*: Spoiled by early frost; but little harvested. *Hamilton*: Killed by frost in September. *Appanoose*: Entirely destroyed by frost. *Jones*: Badly injured by frost. *Polk*: Badly frosted. *Crawford*: Destroyed by drought, blight, and frost.

MISSOURI.—*Benton*: No buckwheat on account of hot, dry weather. *Chariton*: Good. *Vernon*: No buckwheat on account of drought.

KANSAS.—*Kingman*: Blighted by dry weather, and will not pay for harvesting. *Neosho*:

Nearly a failure; cause, dry weather. *Lincoln*: All blasted by the heat of July, August, and September. *Labette*: Short for want of rain. *Atchison*: Killed by heat at blooming time. *Montgomery*: Almost a failure.

NEBRASKA.—*Hamilton*: Grew over 4 feet high; grain good, but only about 5 per cent. filled. *Boone*: Injured by frost. *Platte*: Killed by frost.

POTATOES.

The returns of December of the potato crop show no change from the estimates made in November, and there is a large decline in the product for this year as compared with 1877.

The acreage planted was within a small per cent. the same as last year, the difference being less than one per cent. The New England and Middle States fell off in product nearly one-third; the South Atlantic States increased their small yield of 1877; the States north of the Ohio River decreased about one-fourth; the States west of the Mississippi show a decided increase in product. The leading complaint was the extreme heat, which especially affected the late plantings; in some places it was combined with drought, and in others with excessive moisture, causing rot. The average yield for the whole country will be 69 bushels per acre, against 94 bushels in 1877, thus making a total product, in round numbers, of 124,000,000 bushels for 1878, against 170,000,000 in 1877.

The following extracts from correspondents are given:

MAINE.—*Piscataquis*: Smallest crop for years owing to a decrease in acreage, rust, and rot. *Sagadahoc*: Lightest crop we have had for some years; drought and bugs the cause.

NEW HAMPSHIRE.—*Grafton*: General condition very low, attributable to bugs and rust. *Cheshire*: Poorest crop for many years; blasted, rotted, and eaten by bugs. *Stafford*: Greatly lessened in quantity and materially injured in quality by the ravages of bugs. *Sullivan*: Promised well early in the season, but beetle, grub-worm, and rust have wrecked the crop.

VERMONT.—*Essex*: One-fourth of the crop rotted; in many places more.

NEW YORK.—*Rockland*: Very poor, not more than half a crop. *Genesee*: Seriously affected by blight, and, since digging, by decay. *Madison*: Rotted badly. *Saint Lawrence*: General condition below an average. *Washington*: Product small, quality good, and price fair. *Westchester*: Indifferent yield; did not grow after the middle of July; vines turned yellow and died. *Albany*: Very poor. *Greene*: The poorest for many years; some fields hardly worth digging. *Saratoga*: In the west and south of the county almost a failure; many fields not returning the seed; we will realize about one-third of usual crop. *Warren*: Early varieties nearly a failure; general yield about 50 per cent. of last year, with still lower average in quality. *Fulton*: The poorest crop ever known in the county; rust and bugs. *Wyoming*: Suffered from late spring frosts, beetle, and blight, and have rotted badly since harvest. *Osage*: An unusually productive year for all crops but potatoes, which are a failure.

NEW JERSEY.—*Burlington*: Generally a poor yield. *Warren*: Shortened by drought.

PENNSYLVANIA.—*Perry*: Affected by dry season. *Armstrong*: Not more than 50 per cent. of our usual crop, owing to drought during July and August. *Beaver*: Very small yield and poor quality. *York*: Affected by extremely hot, dry weather. *Clearfield*: Not more than half a crop, and that inclined to rot badly. *Elk*: Very light yield, small in size, and of inferior quality. *Indiana*: Product greatly reduced by drought during August and September; small, and generally indifferent. *Lawrence*: Failure throughout the county. *Erie*: About half of last year's crop. *Lycoming*: Not more than half a crop.

MARYLAND.—*Montgomery*: Product greater than last year; quality about equal. *Worcester*: Very good crop.

VIRGINIA.—*Prince William*: Affected by dry weather during September and early part of October; yield below an average, but quality good. *Fluvanna*: Very good. *Macklenburg*: Product of early planted very fine, but yield of fall crop much below expectations. *Spottsylvania*: Fine crop and favorable season. *York*: Small yield, owing to continued drought. *Northampton*: Very short; prevented from coming up by continued dry weather. *Campbell*: Very fine in quality. *Orange*: About equal to last year's crop. *Dinwiddie*: We have the finest crop ever harvested in this county. *Highland*: In some localities almost a failure on account of rot; early crop did well; free from rot. *King and Queen*: Finest for several years. *Roanoke*: The quality is finer than I have ever known, with large yield, and not injured by beetle.

NORTH CAROLINA.—*Hertford*: An abundant crop. *Person*: Unusually fine.

SOUTH CAROLINA.—*Lexington*: First crop good, second slightly inferior, giving an average of about 100.

GEORGIA.—*Dooley*: Decidedly the finest crop since 1862. *Elbert*: Full average, still green and growing. *Jefferson*: Fine crop. *McDuffie*: Best for six years. *Floyd*: Damaged by drought.

ALABAMA.—*Calhoun*: Fine yield; have raised the second crop from the same ground, of the Beauty of Hebron; yield not equal to spring crop, owing to poor stand; planted one week after digging, and many did not come up.

MISSISSIPPI.—*Grenada*: Full average. *Jefferson*: About equal in quality and condition to last year.

TEXAS.—*Coryell*: Cut short fully 40 per cent. by dry weather. *Dallas*: Seriously affected by drought. *Liberty*: Increased acreage in this crop, but the experiment proved unsuccessful; all rotted. *Austin*: Fall crop very promising, though it has been affected by late dry weather.

TENNESSEE.—*Blount*: Seriously affected by continued drought. *Putnam*: Well matured; crop never better.

WEST VIRGINIA.—*Braxton*: The product of Irish potatoes less than last year, the quality an average. *Pendleton*: Below an average yield, and rotting badly. *Doddridge*: Injured by second growth.

KENTUCKY.—*Cumberland*: A good year for both Irish and sweet potatoes. *Lewis*: Sweet potatoes improved by recent dry weather.

OHIO.—*Medina*: A great quantity produced, but there is a general complaint of rot. *Seneca*: Potatoes worth from 75 to 80 cents per bushel, and being shipped into the county from abroad. *Vinton*: Crop short, owing to drought in August. *Coshocton*: Materially injured by extreme heat in August and September. *Perry*: The average far below last year; some damage in places by bugs. *Ashtabula*: A very poor crop, except the Early Rose. Late potatoes an utter failure, but few in a hill and half of them rotten. *Geauga*: Early varieties fair, but small in size; late varieties almost a failure and rotting badly. *Lorain*: Scarcely half a crop. *Pickaway*: Early potatoes good in yield and quality; late crop not so large a yield, but as good in quality as last year. *Morrow*: In some localities a reasonable crop; in others near by not worth digging. Potatoes did best on rolling loamy soil. *Scioto*: Both early and late potatoes affected by drought.

MICHIGAN.—*Calhoun*: Injured by extremely wet weather early in the season. *Saginaw*: Have commenced to rot, and fears are entertained of great loss. *Bay*: Twenty-five per cent. of the crop has rotted since September 1. *Delta*: Season favorable to ripening; of this crop but little is raised, and that of early varieties. *Hillsdale*: Quite small, but good. *Mason*: Late potatoes not as good as the early planted. *Chippewa*: Extra good in quality, but short yield. *Wayne*: Almost burned up by the heat of July and August, and not more than half a crop, but quality very good. *Emmet*: A very poor yield.

INDIANA.—*Wabash*: Irish potatoes small, scarce, and rotting badly; not an average crop planted. *Decatur*: Season unfavorable; crop short. *Switzerland*: Improved since last report. *Hendricks*: Crop cut short by dry weather early in the season. *Marion*: Very light; part of the crop not worth the expense of digging.

ILLINOIS.—*Carroll*: The late planted a light crop. *Clark*: Quality good, but product

reduced, and potatoes small; in some places they have rotted in the ground. *Hardin*: Reduced acreage; a bad stand and small yield. *White*: Cut short by drought. *Johnson*: Scarce on account of bugs and dry weather. *Ogle*: Fewer and smaller than last year. *Logan*: Better in yield and quality than was expected a month ago. *Tazewell*: Late potatoes a light crop, but of good size and excellent quality. *Winnabago*: Late potatoes shortened by drought. *Morgan*: Injured by drought. *Union*: Sweet potatoes formerly a staple crop, but about abandoned on account of shrinkage in product and price. *Boone*: Very near a failure; worth 50 cents a bushel.

WISCONSIN.—*Jackson*: Crop destroyed to a large extent by Colorado beetles—came suddenly and farmers were not prepared for them. *Milwaukee*: A large portion of early potatoes rotted on account of wet spring. The dry weather of July, August, and September materially diminished the late crop. *Walworth*: "Potatoes few and small." *Adams*: Injured by rain.

MINNESOTA.—*Washington*: Injured in quality by Colorado beetles. *Rock*: Smooth and dry, and free from injury by worms. *Kandiyohi*: Suffered from the Colorado beetle, but the season more than matched them.

IOWA.—*Polk*: Irish potatoes poor in yield and quality.

MISSOURI.—*Benton*: Late potatoes a short crop. *Chariton*: Irish potatoes suffered from drought; sweet potatoes generally destroyed by insects when planted. *Jefferson*: Early potatoes turned out well, but took the rot after being gathered. *Ripley*: Late potatoes cut short by drought. *Vernon*: No late potatoes on account of drought. *Lawrence*: Badly rotten on some farms, on others not hurt. *Caldwell*: Quality very poor, and potatoes small; seem to have wilted in the dry, hot ground. *Carroll*: Vines killed by dry, hot weather of August and September; all late potatoes damaged; quality and quantity much below an average. *Maries*: Irish potatoes plenty but small; sweet potatoes never better, but raised on a small scale. *Newton*: The early planted and well-cultivated a fair yield and of good quality; the late planted everywhere inferior.

KANSAS.—*Marion*: Late potatoes a failure. *Douglas*: Late potatoes a failure; early potatoes good. Owing to drought late potatoes are small and few in a hill. *Montgomery*: Almost a total failure. *Cowley*: Irish potatoes scarce and worth 40 cents per bushel; sweet potatoes 80 cents per bushel. *Labette*: Irish potatoes injured by drought. *Cloud*: Crop injured by wet weather in July, and not an average in either product or quality.

NEBRASKA.—*Knox*: Some very fine sweet potatoes raised this year.

CALIFORNIA.—*Contra Costa*: Early potatoes very fine. *Sonoma*: Potatoes blighted in this region. *Plumas*: Potatoes injured by a hard horny worm boring the potatoes, and in some cases killing the vines.

OREGON.—*Multnomah*: Crop did not yield as well as usual on account of a very dry season; the late planted scarcely came up. *Tillamook*: By far the best crop for six years. Tubers sound and healthy and no blight. *Clackamas*: Crop light but quality good.

SWEET POTATOES.

NEW JERSEY.—*Burlington*: Fine crop; quality, though not superlative, is good; favorable weather for gathering, and price lower than I ever knew it.

VIRGINIA.—*Northampton*: Early digging poor, but late pretty fair. *Halifax*: Best crop for years; yield large and quality excellent.

NORTH CAROLINA.—*Hertford*: Poor crop. *Greene*: Very good. *Wilson*: Best crop for several years.

SOUTH CAROLINA.—*Lexington*: Fine in both product and quality. *Horry*: General condition never better.

GEORGIA.—*Fannin*: Small yield, but large in size and of excellent quality. *Jones*: Both product and quality good. *Worth*: Seriously injured by excessive rains; vines have run to the length of 30 feet. *Jefferson*: Injured by too much rain. *Coffee*: Very fine crop; selling at 12½ cents per bushel. *Troup*: Severely injured by continued hot, dry weather.

ALABAMA.—*Baldwin*: Suffered for want of late rains. *Clarke*: Yield cut short by dry fall. *Crenshaw*: Full average crop.

MISSISSIPPI.—*Grenada*: Full average yield of good quality.

TEXAS.—*Dallas*: Very seriously affected by drought. *Austin*: Will be a very heavy crop. *Upshur*: Full average. *Fayette*: Average of the two crops is fair.

WEST VIRGINIA.—*Braxton*: Increased product and good quality.

TENNESSEE.—*Henry*: Small yield on account of an excess of rain. *Putnam*: Well matured and exceedingly fine, never better. *Montgomery*: All dug, and yield about 30 per cent. better than last year.

NEBRASKA.—*Saunders*: Good in yield and quality; but little cultivated.

HAY.

The conditions of growth in nearly all the States during 1878 were remarkably favorable to grass crops. The result is shown in a hay product over 20 per cent. greater than last year. The only States that fell short were New Hampshire, Maryland, Michigan, and Illinois, and in these the deficiency is small.

The quality of the crop was also above average in all the States except Vermont, Massachusetts, Connecticut, New York, New Jersey, Kentucky, Wisconsin, Minnesota, and Iowa.

MAINE.—*Piscataquis*: The product is large. *Cumberland*: Average low, 1½ to 2 tons per acre. *Waldo*: Crop good.

NEW YORK.—*Genesee*: Yield very large, but quality inferior; abundant crop for winter feeding. *Saint Lawrence*: A large yield and well secured.

PENNSYLVANIA.—*Elk*: Extra crop. *Jefferson*: Good average.

MARYLAND.—*Montgomery*: Largest yield for years with average quality. *Frederick*: An excellent crop.

VIRGINIA.—*Henrico*: Unusually fine crop. *Spottsylvania*: An abundant yield. *Halifax*: Product large and saved in excellent condition. *Greenville*: Crop good and weather favorable for securing. *Dinwiddie*: Best ever raised in the county. *Highland*: Abundant yield, though quality is under average. *Princess Anne*: Large crop well saved. *King and Queen*: Some wet weather while curing, but an average crop.

GEORGIA.—*Carroll*: Finest crop ever made here, and saved in good condition.

ALABAMA.—*Barbour*: Have saved 50 tons from native grasses on prepared lands, and realized \$20 per ton for what I had to sell.

MISSISSIPPI.—*Choctaw*: An abundance saved, but generally native grasses.

TEXAS.—*Liberty*: Increased interest in the curing of this crop; very good yield. *Titus*: Splendid in both yield and quality; much of the crop lost on account of heavy rains. *Austin*: Heaviest yield for years; an immense quantity saved. *Bexar*: Never a better crop; large amount saved; worth \$7 per ton.

TENNESSEE.—*Henry*: Largest crop ever saved. *Montgomery*: About equal to last year.

WEST VIRGINIA.—*Marion*: Hay and fodder very plenty, and great quantities of old hay on hand. *Morgan*: More than an average crop. *Braxton*: The product not so large as last year, but the quality much better. *Pendleton*: Hay and pasturage never better.

KENTUCKY.—*Fayette*: Crop well grown before the drought, which gave a fine harvest season.

OHIO.—*Perry*: Yield and quality excellent. *Geauga*: A fine crop and of good quality. *Pickaway*: A large crop and about the same as last year. *Morrow*: Rather wet during harvest; prices low. *Scioto*: Saved in better condition than usual.

MICHIGAN.—*Delta*: Grass made nearly a full growth before dry weather set in; harvest favorable. *Chippewa*: Reduced in quantity but of extra quality. *Newaygo*: Fine crop, but not all well secured. *Houghton*: Light. *Leelenaw*: Light crop. *Saint Joseph*: Crop large and good.

INDIANA.—*Wabash*: Hay and fall pasture good. *Whitley*: Pasture good.

ILLINOIS.—*Bureau*: The crop unusually good. *Hardin*: Less than an average crop saved owing to frequent heavy rains at harvest. *Johnson*: Stood too long before cutting. *Ogle*: A large yield and generally of good quality. *Greene*: Pastures short on account of dry fall.

WISCONSIN.—*Jackson*: Weather wet at harvest and much of the hay spoiled; generally light except clover. *Dunn*: Thousands of tons lost by heavy rains in July; wild hay suffered equally. *Green Lake*: Injured by hot weather at and since the time of cutting. *Richland*: Less clover raised than usual. *Columbia*: Very much injured during the haying season, and also in the stack, by heavy and continued rains. *Walworth*: Hay and pastures were never better. *Outagamie*: Fall pasture abundant. *Monroe*: Large crop, but not well secured; 25 per cent. injured by rains in harvest.

MINNESOTA.—*Ramsey*: Damaged by storms during the first three weeks of July. *Washington*: Badly injured by rains at the time of cutting. *Goodhue*: Suffered serious damage during hay-making season from frequent rains. *Polk*: Crop very large, but large quantities burned this fall, leaving a short supply. *Houston*: Good crop, but badly damaged by wet weather during harvest. *Rock*: Unusually heavy and mostly well secured. *Kandiyohi*: A good growth, but too coarse to be of good quality. *Olmsted*: Half the crop lost through wet weather.

IOWA.—*Polk*: Yield and quality good. *Johnson*: About 40 per cent. above an average crop, when compared with several years, but no better than last year. *Howard*: Injured by rain while being cut, and also in the stack since. *Mitchell*: Badly damaged by rain while being secured. *Plymouth*: Prairie grass is the hay crop of this county. *Kossuth*: Tame hay very heavy, but damaged in curing; prairie hay very fine. *Marion*: A large surplus at nominal prices.

MISSOURI.—*Chariton*: An average yield and put up in fine condition. *Polk*: Matured well. *Adair*: Better quality and as heavy as last year. *Maries*: Some timothy meadows damaged by standing too long, but red-top or herd's-grass mostly grown here; all harvested in good condition. *Newton*: A fair crop and quality good. *Phelps*: German millet raised to some extent for fodder; it yields as high as 6 tons per acre. It is usually sown on wheat lands immediately after harvest.

KANSAS.—*Montgomery*: An unusually fine crop secured in fine condition. *Washington*: Eight acres of German millet, on high prairie, sown early in May, grew 6 feet high, producing 50 bushels of seed and $3\frac{1}{2}$ tons of hay per acre; it will produce more stock feed than any other crop.

NEBRASKA.—*Hamilton*: Only wild grass hay; it grew very large.

CALIFORNIA.—*Contra Costa*: Very large crop, but weedy. *San Diego*: Injured by late rains.

NEW MEXICO.—*Santa Fé*: Our hay all wild, from the grama grasses of the prairie. *San Miguel*: The wild hay light from lack of rain.

WYOMING.—*Laramie*: Wild hay cut in enormous quantities; prices lower than ever known before.

DAKOTA.—*Grant*: Tame hay not yet grown in this county.

SORGHUM.

This crop is receiving increased attention, especially in the trans-Mississippi States and Territories, where the results of the year's culture are noted by different correspondents as very satisfactory. On the Atlantic and Gulf coasts there is, on the whole, a considerable increase. Virginia reports a product 41 per cent. greater than in 1877. The eastern slope of the Mississippi Valley shows a decline. A variety called the "redhead" is growing in favor with the farmers of South Carolina. In the West, the Minnesota Amber cane has produced the most satisfactory results. In Stearns County, Minnesota, this variety is reported as yielding as high as 300 gallons of sirup per acre. Dela-

ware County, Iowa, manufactured over 100,000 gallons of sorghum sirup during the year, and found a steady home demand for the whole.

VIRGINIA.—*Greenville*: That grown from seed sent from the department proves to be very fine

SOUTH CAROLINA.—*Spartanburg*: The cultivation of this crop is increasing; with the evaporators the quality of sirup is very good, and the color similar to New Orleans molasses.

GEORGIA.—*Jackson*: Large crop, and sirup selling at 30 and 40 cents per gallon.

FLORIDA.—*Savannah*: Increasing in favor, and will be grown much more extensively next season; will average 400 gallons per acre on cowpenned land.

ALABAMA.—*Dale*: Finest crop ever raised in the county. *Barbour*: Declining in favor, on account of its exhaustive properties to land; acreage decreasing.

TEXAS.—*Rusk*: Two years ago this was extensively grown here, but very little is now raised, being superseded by the Louisiana ribbon-cane, which is worth 30 to 50 cents per gallon. *Williamson*: Extensively raised; the Honduras cane is generally preferred; yield per acre from 95 to 150 gallons. *Washington*: They who have experimented with this, claim that it does well in this climate and is a paying crop. The acreage is rapidly increasing, and promises to be an important industry.

ARKANSAS.—*Ashley*: The farmers of this county are beginning to raise extensively the ribbon variety; several small mills are now in operation; the yield is from 200 to 300 gallons per acre, and sells for 50 cents per gallon.

ILLINOIS.—*Tazewell*: Large yield and making good molasses. *Hamilton*: Cut short by drought. *Bureau*: Cane yield about as usual, but sirup yield decreased.

MINNESOTA.—*Swift*: The Amber sugar-cane introduced a year ago, and has proved valuable; this year it has produced from 75 to 150 gallons of excellent sirup per acre. *Meeker*: Amber cane has been extensively raised, and with good results. *Stearns*: Minnesota Early Amber sugar-cane far ahead of old kinds. The highest authenticated yield was 257 gallons of sirup, the product of 135 square rods of land. *Redwood*: Very good where made before frost; sirup excellent. *Le Sueur*: Quantity raised very great; too much for the machinery to work up, and hence some will be lost. *Pope*: Doing well. *Scott*: Above average; Amber cane has made some sugar, but was mostly worked into molasses.

IOWA.—*Louis*: A considerable crop in this county, and the sirup of good quality. *Dela-war*: Crop increasing each year; not less than 100,000 gallons manufactured in the county this season, and the demand for sirup equals the production. *Polk*: Below an average; caused by too much rain, followed by dry weather. *Lee*: A large crop; juice better than usual. *Marion*: A good crop, but injured by September frosts; much will not be worked.

MISSOURI.—*Chariton*: Sorghum excellent. *Phelps*: Never better than this year, and an increased amount planted. *Ripley*: The Amber cane a great success. *Vernon*: Juice uncommonly rich; 210 gallons of good sirup from 1¾ acres.

KANSAS.—*Kingman*: Does best in dry weather; some fields produce 80 gallons per acre.

NEBRASKA.—*Platte*: Partially killed by frost.

DAKOTA.—*Hanson*: Was never better, making a No. 1 sirup; common varieties have been discarded for the Minnesota Amber cane.

UTAH.—*Kane*: Yield good where pure seed was planted; the Chinese sugar-cane the best.

TOBACCO.

The crop of the present year has been secured under exceptionally auspicious conditions of weather; the bright open days of September favoring the growth, while the unusual delay of severe frost enabled the plant to mature thoroughly before the knife was applied. Of the large producing States, Virginia, Maryland, Connecticut, and Massachusetts report an improvement in quality. Twelve States, representing the bulk of the total production of the country, report the product, compared with last year, as follows:

Kentucky, 60; Virginia, 73; Missouri, 56; Tennessee, 53; Ohio, 90; Maryland, 84; Indiana, 83; North Carolina, 89; Pennsylvania, 86; Illinois, 50; Connecticut, 86; Massachusetts, 95.

The following notes are taken from our November returns:

MARYLAND.—*Montgomery*: Finer yield than last year, with average quality. *Calvert*: Below an average in quantity, but the quality is better than for years. *Charles*: Acreage 25 per cent. below an average, but quality good.

VIRGINIA.—*Fluvanna*: Excellent crop. *Henry*: Fair yield and fine quality. *Mecklenburg*: The quality is greatly superior to that of last year; season favorable for maturing and securing the crop. *Spotsylvania*: Quality superior, but very small acreage, the latter the result of ruinously low prices. *Halifax*: Crop shortened by scarcity of plants, unpropitious early growing season, and low prices. Quality generally good. *Campbell*: That portion of the crop which was planted in good season ripened very well, and is rich and waxy. *Orange*: The average of the crop in my county this season does not exceed one-fourth of that of last year. *Dinwiddie*: Acreage much smaller than last year, but quality better. Good crop, but the price is so ruinously low that the farmers are almost bankrupt. *Craig*: Greatly impaired by excessive rains and high water. *Henry*: Reduced yield, owing to scarcity of plants, but the quality is better than for some years. *Louisa*: The acreage much less than last year, but both yield and quality better. *Pittsylvania*: Although the crop is smaller than last season the quality is much superior, and will realize more money. *Prince Edward*: Acreage one-third less than average; quality fully 100. *Madison*: Very heavy, but crop small. *Brunswick*: Acreage small but quality superior; favorable weather for housing.

NORTH CAROLINA.—*Greenville*: Product greatly reduced by hailstorms throughout the county, but quality very superior. *Person*: Yield reduced by hailstorms in the spring to a little below last year, but quality above; matured well on the hills. *Wayne*: Not yet secured, but favorable indications for a fine crop. Increased acreage is anticipated for next season. *Alamance*: Smaller acreage than last year, but yield heavier per acre; cured up better, and is of finer quality. *Granville*: Fair average crop. *Iredell*: Of unusually fine quality. *Rockingham*: Greatly improved in both product and quality by late favorable weather. *Transylvania*: Scarcely worth reporting.

ALABAMA.—*Conecuh*: Improving. The people are cultivating this crop more extensively, and giving it closer attention.

TENNESSEE.—*Henry*: Fair crop. *Robertson*: Improved as it matured, and the quality is better than last year; housed and cured in good condition; about 50 per cent. decrease in acreage with the same yield per acre. *Smith*: Very little planted owing to low price. *Dickson*: Greatly reduced in product by worms. *Putnam*: Very good; much finer yield than last year.

KENTUCKY.—*Cumberland*: Good in quality, but will fall nearly 50 per cent. short in yield. *Mcade*: Will not be over half a crop. *Crittenden*: Not over one-third an average crop planted. *Graves*: Cut short by dry weather.

OHIO.—*Montgomery*: Tobacco curing well. *Noble*: Badly injured by being flooded. *Clermont*: Cut and housed in good condition.

ILLINOIS.—*Johnson*: Nearer a failure than for many years; not as much planted and the quality quite inferior.

MISSOURI.—*Chariton*: About half crop planted, and generally housed in good condition. *Phelps*: Very fine in quality and but slightly injured by worm. Season very favorable for the production of a superior staple. *Carroll*: Season favorable and quality at least 25 per cent. above last year, but low prices have induced many farmers to abandon its culture.

ARKANSAS.—*Pope*: None raised for market, though every farmer grows enough for his private use. There will be but little raised next season as there is sufficient on hand for two years. *Marion*: This is a fine tobacco region, and but for the stringent law would be grown extensively.

FRUIT.

The conditions of fruit growth during 1878 were quite unfavorable.

GRAPES.—The grape culture of the Atlantic slope was very unsuccessful, especially in the regions of Delaware and Chesapeake Bays. Many whole vineyards in this section failed to yield anything that might be called a crop. In the South even the hardy Scuppernong succumbed to adverse climatic conditions and withheld its usual abundant product. South Carolina, Florida, and Texas report an increased product, but this branch of culture is very limited in those States. All the States of the Mississippi Valley report decreased products except Nebraska, where vine culture is still in its infancy. California, however, reports a greatly increased yield of her peculiar production, which embraces mostly the European varieties of the grape.

APPLES.—This crop shows an increased yield in all the New England States, New York, Texas, and the Pacific States. In all the other States it shows a falling off; Missouri reporting less than half of last year's crop.

PEARS.—All the States yield less than last year except Kansas, Nebraska, and California. The crop suffered most severely in the Middle Atlantic region, where the yield ranges from half to two-thirds of last year.

MAINE.—*Piscataquis*: The most abundant crop of apples for many years; for cooking purposes they are selling for 10 cents per bushel.

NEW HAMPSHIRE.—*Cheshire*: Apples in abundance and of the best quality.

NEW YORK.—*Genesee*: Good yield of apples in the north and east section of county, but failure in the south and west. *Rockland*: Early indications favorable for a large yield of apples, but the crop is slightly below average. *Washington*: An immense crop of apples; a drug in the market and selling at \$1 per barrel, and for 5 and 6 cents per bushel for cider, delivered at mill. *Wayne*: Apples worth only 10 cents per barrel on the trees; thousands of barrels being consumed by stock and left to decay in the orchard. *Wyoming*: Fine crop in the eastern part of county.

NEW JERSEY.—*Burlington*: Very uneven apple crop; grapes injured and badly rotted. *Camden*: Apples almost a failure in this county. *Warren*: Winter apples heavy and good quality. *Atlantic*: Grapes rotted badly. *Perry*: Grapes injured by spring frosts.

PENNSYLVANIA.—*Beaver*: Yield varies in sections; general average small. *Monroe*: Owning to May frosts the crop falls below an average. *Perry*: Very small yield, from the effects of spring frosts. *Indiana*: Small crop of apples on the high land; in the valleys none. Grapes affected by spring frosts. *Potter*: Apples injured by spring frosts after blossoms had opened; do not think we have averaged half a crop. The trees that blossomed late, such as the Northern Spy, escaped injury.

MARYLAND.—*Frederick*: Apples almost a total failure. *Cecil*: Good yield of apples, but compared with other bearing seasons the product is not over 50.

VIRGINIA.—*Mecklenburg*: Winter apples failed to mature and dropped off to such an extent that the crop will prove almost an entire failure. *Lee*: Apples abundant, but rotted early, leaving but few for winter use. *Augusta*: Apples and grapes injured by frost in early part of season. *Hilland*: Over an average in yield though rotting somewhat. *Henrico*: Grapes a fair crop of superior quality.

ARKANSAS.—*Little River*: An average crop.

TENNESSEE.—*Putnam*: Only a medium crop. *Blount*: Were about an average, but have rotted badly, so we have put them at 100. *Greene*: Good yield but badly decayed. *Henry*: Very few. *Robertson*: None for winter on account of rot. *Montgomery*: Small crop.

WEST VIRGINIA.—*Marion*: Apples have the appearance of not keeping well. *Morgan*:

Two-thirds of the crop killed by frost in May. Nearly all of the grapes killed. *Raleigh*: All kinds very abundant. *Jefferson*: The product of grapes about 70. *Braxton*: Apples less in product, and poorer in quality than last year.

KENTUCKY.—*Grayson*: At least three-fourths of the winter-apple crop rotted and fell off before gathering time. *Lewis*: An excessive production of apples, but mostly affected with dry and bitter rot.

OHIO.—*Medina*: The apple crop considerably above an average, and a drug in the market. *Seneca*: Apples superabundant, the best selling at 20 cents per bushel. *Vinton*: Winter apples have fallen off prematurely and have rotted badly. *Ashland*: A wonderful apple crop. *Perry*: The apple crop enormous. Grapes very good in some places, in others an entire failure. Pears a small crop, but quality good. The peach crop the largest for years, but early varieties rotted badly. *Geauga*: Apple crop very abundant. Good winter apples have sold at 10 cents per bushel in the orchard, choice at depot 25 cents. Winter fruit will not keep as well as usual. High winds blew many off the trees prematurely. *Pickaway*: A large crop of apples, but many fell off before picking time. Grape crop large. *Noble*: Apples abundant, but dropped from the trees badly and rotting since gathered. *Allen*: Peaches and grapes ruined by frost. *Hancock*: Apple crop very large, and best varieties of winter apples selling for 50 cents a barrel in the orchard; thousands of bushels left to rot on the ground. Grapes a failure. *Morrow*: The largest crop ever known in this section, and quality above an average. The prices hardly pay for handling them. Good cider-apples worth only 7 cents per bushel aboard of the cars.

MICHIGAN.—*Calhoun*: Grapes destroyed by frost May 14, except in a few places on very high land. Apples suffered from same cause. *Hillsdale*: The apple crop has far surpassed expectations, although many orchards were an entire failure. *Mason*: Apple crop very poor on account of June frost.

INDIANA.—*Hamilton*: Apples have rotted worse than ever before. The bitter rot seems to be getting worse every year. *Wabash*: The apple a full bloom but not two-thirds of a crop; pears still worse. *Decatur*: Apples rotted on the trees. *Carroll*: The apple crop very poor; destroyed by late spring frosts. *Noble*: Some kinds of apples did well. *Shelby*: Winter apples almost a failure, on account of hot weather in July and August; they fell off and rotted. *Whitley*: Apples have never done better than this season.

ILLINOIS.—*Bond*: Apples and pears short from late frosts and hot summer. Grapes injured by rot. *Bureau*: Not over one-fourth of a crop of apples, and poor and scabby. Grapes injured by spring frosts. *Clark*: Apples and pears better than last year, but yet a short crop. A full crop of peaches. Grapes rotted badly. *Hardin*: Apples fell off—nearly an entire failure—not 100 barrels in the county. *Pike*: Apples are almost a failure. *Tazewell*: Apples are very inferior. *Union*: Apples barren this year; peaches just the reverse. *Calhoun*: Peaches a good early promise, but the crop an entire loss on account of curculio and extreme hot weather.

WISCONSIN.—*Washington*: Locality had much to do with apples. In some places abundant, in others almost a failure, owing to May frosts, which destroyed the bloom. *Wauworth*: Apples and grapes light yield and poor quality.

MINNESOTA.—*Ramsey*: Grapes injured in some localities by late spring frosts. *Washington*: A promise of large crop, but destroyed by late spring frosts. *Goodhue*: Curtailed by two or three frosts in May.

IOWA.—*Delaware*: Apples, grapes, and pears injured by late spring frosts. *Polk*: Grapes a fine promise, but were killed by frost May 12; pears killed and apples injured by the same frost. *Guthrie*: Apples and grapes scarce and poor, owing to snow-storm and freeze in May. *Franklin*: Apples are the largest crop ever raised in the county; grapes were killed by spring frosts. *Jones*: Late frosts ruined the grapes and plums, and injured the apples. *Sac*: Apples all killed by frost in the spring; grapes nearly all killed.

MISSOURI.—*Chariton*: Apples almost an entire failure; peaches about half a crop; grapes injured by rot. *Madison*: Apples have fallen off badly; also rotting on the trees. *Platte*: Apples and pears almost a failure; apples imperfect, small, knotty, and rotting at the core. *Butler*: Apples of good quality, but the trees did not bloom well. *Mississippi*: Apples all

rotted; there are not ten bushels of good apples in the county. *Saint Genevieve*: Grapes a failure, and vines mostly grubbed out. *Cole*: Not apples enough for home consumption, and quality poor: grapes a failure, except "Norton's Virginia." *Maries*: Apples grew finely late in the season, but are rotting badly. *Pemiscot*: Fruit crop almost an entire failure.

KANSAS.—*Atchison*: Grapes mildewed badly. *Douglas*: Apples a light crop, and badly damaged by scab and codling moth; ripened early, fell, and soon decayed; peaches a full crop and good; grapes less than half a crop; rotted and fell early. *Labette*: Grapes injured by wet summer. *Saline*: Not many apples raised; peaches very plenty. *Reno*: A few apples of excellent quality.

NEBRASKA.—*Dodge*: Grapes injured by late spring frosts. *Saunders*: A large increase in apples and peaches over last year, and quality very fine, but only a few orchards in bearing.

CALIFORNIA.—*Contra Costa*: Grapes considerably mildewed, but foreign varieties abundant; apples and pears large and trees overloaded. *Trinity*: Grapes damaged by mildew. *San Diego*: Grapes mildewed.

OREGON.—*Multnomah*: Not an average crop; affected by heavy frosts and early dry season, and much dropped off when quite small.

UTAH.—*Box Elder*: The apple crop barely produced one-fourth of an average, owing to the codling moth and other insects. *Kane*: Apples better than ever known, except in one locality, where they were a total failure from effects of codling moth; grapes considerably injured by a small fly. *Salt Lake*: The codling moth continues to destroy apple and pear crop. *Tooele*: Apple and grape crop considerably reduced by late spring frost and codling moth.

Table giving the average yield per acre in 1878 of—

States.	Corn.	Wheat.	Rye.	Oats.	Barley.	Buckwheat.	Cotton.	Potatoes.	Sweet potatoes.	Leaf tobacco.	Hay.	Sorghum molasses.
	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Pounds (lint).</i>	<i>Bushels.</i>	<i>Bushels.</i>	<i>Pounds.</i>	<i>Tons.</i>	<i>Gallons.</i>
Maine.....	39.4	14.2	16	35.4	22.3	24		74			1.88	
New Hampshire.....	39	14.4	12.2	37	20	20		72			1.14	
Vermont.....	41	18	19.4	32	27.2	27		72			1.33	
Massachusetts.....	36.1	22.5	17.1	29		12.5		60		1,600		
Rhode Island.....	32		13	24	19			65			1.60	
Connecticut.....	29.6	13	14.2	30.4	22.5	14		45		1,400		
New York.....	36.1	19	17.1	32.2	20	20		51			1.35	
New Jersey.....	36	15	15.1	31.1	20	19.2		80			1.75	
Pennsylvania.....	35	16	15.4	32.4	26	16.4		58		1,200		
Delaware.....	25	13	15.5	22.5		20		67			1.72	
Maryland.....	23.5	12.1	14.6	20				100			1.24	
Virginia.....	17.5	7.2	9.1	15.7		15.4		87		700	1.26	
North Carolina.....	13.6	6.5	8.3	16		18	169	69		739	1.43	93
South Carolina.....	9.3	5.5	5.5	13.4			163	63		573		81
Georgia.....	11	7	8.1	16.7	21		101	67				73
Florida.....	9		9	15.3			166	96		490	1.73	05
Alabama.....	12	7.3	9	16.3			132	102				200
Mississippi.....	13	6.8		16.6			132	88		537	1.80	73
Louisiana.....	19.9			14			164	73		270	1.54	110
Texas.....	26.3			37	34.1		159	88		1,030	2.25	117
Arkansas.....	24	6.6	11.6	24.6			164	84		630	1.59	120
Tennessee.....	19.3	5	12	20.4			275	121		1,057	1.76	102
West Virginia.....	27.2	11.5	14	26			265	72		607	1.6	85
Kentucky.....	23	9.3	12.2	26.4				75		60	1.53	90
Ohio.....	35	18	18	36				75		87	1.41	60
Michigan.....	37.4	18.3	17	32.1	26.1	17		66		811	1.31	75
Indiana.....	33	16	14.5	29.6	25	15.4		76			1.30	97
Illinois.....	27.1	13.2	16.2	34	23.3	14.6		67		800	1.49	105
Wisconsin.....	37.5	12.4	18.4	38.1	26	15.6		68		700	1.55	87
Minnesota.....	38.1	12	22.1	42.4	29.4	14.1		108			1.72	117
Iowa.....	37.4	9.4	16.6	36.3	23.5	17.2		100			1.80	103
Nebraska.....	26.2	11.1	15	30.6	29.2	17.3		85		770	1.62	96
Missouri.....	34	16.3	19.2	36	26.4			112			1.88	102
Kansas.....	42	13.1	19.1	33.4	25.1			125			2.05	
California.....	34.5	17.3		23.4	23.4			114			1.90	
Oregon.....	33.3	21.5	25	31	23	21		95				

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DEPARTMENT OF AGRICULTURE.
SPECIAL REPORT—No. 10.

REPORT
UPON THE
CONDITION OF CROPS
AND
LIVE STOCK,
JANUARY, 1879.



WASHINGTON:
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1879.

PRICES OF FARM CROPS



In compiling the prices of farm crops from our returns, we endeavor to give the prices obtained by the farmer for his produce at his home market in December, 1878. Naturally these prices are somewhat lower than those obtained in shipping marts, or by those farmers whose proximity to railways or rivers renders the transit to market less costly; but in those States where the local demand is greater than the local production the price is naturally higher.

CORN.

The price of corn in this country is governed entirely by the quantity produced and the consumption, the quantity exported being so small in proportion to the enormous amount raised that it exercises no influence on the price. For four successive years have we been blessed with increasing and remarkable crops, and in somewhat greater ratio the prices have fallen. The immense crop of 1877, the largest then ever raised in the country, having been 1,342,000,000 bushels, was valued at \$480,643,000; the crop of 1878 exceeded that, but the overproduction brought the price much lower, and the crop, which was 1,371,000,000 bushels, is only valued at \$436,800,000.

The lowest State averages are in Iowa and Nebraska, both of which States increased their products very largely, too great for home consumption and too remote from leading markets; the price has fallen to about one-half it was in 1876. The States showing the highest average price are the Gulf States, from Georgia to Texas, where the consumption fully equals the crop, and where the prices are little less than those of last year. The price per bushel, returned December, 1878, was 31.9; in 1877, 35.8 cents.

WHEAT.

The average price of wheat for the year 1876 was \$1.04 per bushel; for the year 1877, stimulated by war in Europe, the increased crop was worth \$1.08; but for the year 1878, with an increase of upwards of 50,000,000 bushels, the price had fallen to 78 cents per bushel on December 1, 1878.

The crop of 1878, which amounts to 422,000,000 bushels, is worth only \$329,000,000; while the crop of 1877, which was 365,000,000 bushels, was worth \$394,000,000.

In the case of wheat, the price is greatly influenced by the European demand. For the year ending June 30, 1878, it was found that we exported 92,000,000 bushels of wheat (flour included), about 25 per cent. of our whole crop.

From estimates published by the Board of Trade and the Mark Lane Express, of England, it is estimated that the supply of England will be short

13,000,000 quarters, equal to 107,000,000 bushels, leaving that amount to import. Last year the amount imported was 15,000,000 quarters, or 123,000,000 bushels. This supply was mainly drawn from the United States and will be so this year. From estimates in France, published in the "Bulletin des Halles," the wheat crop of 1878 is placed at 82,500,000 hectolitres, or 230,000,000 bushels, being 20,000,000 hectolitres, or 56,000,000 bushels, less than that of 1877, which was a poor crop.

The amount imported into France in 1877-'78 was 22,000,000; the amount needed this year must approximate 70,000,000 bushels. The same bulletin, estimating the sources of supply abroad, says, "the utmost surplus from Russia for export will be 50,000,000 bushels; from Hungary, 17,000,000; and the only other source of supply of any importance is the United States."

The following statement of prices in some of the prominent wheat-growing States since 1874 will fairly illustrate the range of prices in those years:

States.	1874.	1875.	1876.	1877.	1878.
Ohio.....	\$1 04	\$1 09	\$1 14	\$1 24	\$0 86
Michigan.....	1 08	1 15	1 16	1 22	85
Indiana.....	94	97	1 02	1 13	81
Illinois.....	86	91	93	1 04	75
Wisconsin.....	83	91	1 01	93	67
Minnesota.....	70	86	90	91	51
Iowa.....	65	71	90	87	50
Missouri.....	83	95	89	1 00	67
Kansas.....	84	87	86	82	59
Nebraska.....	60	64	73	83	49

COTTON.

In giving the prices of the cotton crop, we are guided by the prices received by the planter, which have ruled excessively low this winter, the average for the whole country being about 8¼ cents per pound. The great value of this crop is founded on the demand for export. Prior to the war, in 1859 and 1860, the amount imported into Great Britain from the United States was four-fifths of their whole importation; during the war it fell off to less than 2 per cent. Starting in 1866 at 37 per cent., we find that in 1878 we had regained the position we held prior to 1861, and that four-fifths of the cotton used and manufactured in Great Britain came from the United States.

The proportion of our total crop exported to foreign ports was 3,340,000 bales, out of a crop of 4,750,000 bales, during the year ending September 1, 1878.

The production of this great staple seems to be too large, and the result is shown in the glutted markets and low prices; the larger crop of 1878 being worth less than that of the preceding year. Basing the calculation on the prices returned by the producer, we find the value of the crop of 1878 to be \$194,700,000, and for 1877 \$240,000,000; while the number of bales was 4,750,000 in 1877 and 5,200,000 for 1878.

TOBACCO.

The price of tobacco is reported as very low this year, being, for the whole country, an average of 5.6 cents per pound on December 1, 1878. This price is mainly the result of an overstock of poor tobacco last year. We have no

accurate data of the yield per acre or product of 1877. The total amount exported and manufactured was a little above 463,000,000 pounds. Allowing 6 per cent. for that used at home and that which evaded the tax, we have a crop for 1877 of about 490,000,000 pounds.

The acreage for 1878 was 76 per cent. of 1877. The quality of tobacco produced was generally better and heavier, making the yield per acre rather more than that of the previous year, except in Kentucky, where it fell off slightly.

We estimate the total crop of 1878 at 393,000,000 pounds (worth \$22,000,000), against 490,000,000 pounds last year.

POTATOES.

The price of this article of prime necessity to the people has not advanced yet to the relative proportion that price bears to production. From returns made in December, 1878, we find the average price to be 58.8 cents per bushel. With a crop almost identical with that of 1876, we have a price much lower per bushel, and a total value of \$10,000,000 less than that year. With a crop some 46,000,000 bushels less than last year the total value does not equal that of the excessive yield of 1877. Subjoined I give a table of product, price per bushel, and total value for the last four years:

Year.	Product.	Price per bushel.	Value.
1875	166,870,000	\$0 38.9	\$65,019,000
1876	124,800,000	65.5	83,860,000
1877	170,092,000	44.8	77,249,000
1878	124,027,000	58.8	73,000,000

Prices of crops from December returns of 1878.

States.	Corn, per bushel.	Wheat, per bushel.	Rye, per bushel.	Oats, per bushel.	Barley, per bushel.	Buckwheat, per bushel.	Potatoes, per bushel.	Tobacco, per pound.	Hay, per ton.	Cotton, per pound.
Maine	\$0 65	\$1 31	\$0 87	\$0 38	\$0 71	\$0 54	\$0 73		\$9 80	
New Hampshire	61	48	76	36	69	55	86		8 85	
Vermont	58	15	70	33	68	54	75		8 85	
Massachusetts	62	50	62	36	75	64	93	\$0 11	13 00	
Rhode Island	53		58	40	85		1 00		18 00	
Connecticut	62	02	85	39	70	73	08	11	11 45	
New York	50	02	58	29	70	50	81	11	7 41	
New Jersey	45	06	60	29		54	87		10 77	
Pennsylvania	48	97	84	27	80	55	70	70	8 06	
Delaware	39	00	62	27		55	60		16 00	
Maryland	45	08	53	28			64	05.5	9 75	
Virginia	43	89	57	34		51	50	05	12 72	
North Carolina	45	00	66	43		50	59	06	9 68	\$0 08.5
South Carolina	54	30	1 13	54			74			08.7
Georgia	61	18	1 15	55	1 20		92	10	13 11	08.2
Florida	73		1 50	76			1 68			08.2
Alabama	59	05	1 04	54			78	11	16 90	08.2
Mississippi	64	35		68			93		15 91	08.3
Louisiana	60			59			68	14	10 00	08.3
Texas	44	86	72	42	61		99	10	9 75	08.2

Prices of crops from December returns of 1878—Continued.

States.	Corn, per bushel.	Wheat, per bushel.	Rye, per bushel.	Oats, per bushel.	Barley, per bushel.	Buckwheat, per bushel.	Potatoes, per bushel.	Tobacco, per pound.	Hay, per ton.	Cotton, per pound.
Arkansas.....	\$0 48	\$0 95	\$0 82	\$0 45	.....	.....	\$0 65	\$0 10	\$12 96	\$0 08.2
Tennessee.....	41	84	61	33	62	73	39	06	10 10	08.1
West Virginia.....	42	86	53	26	75	58	44	06.5	6 81	.....
Kentucky.....	40	76	53	28	87	50	46	05	8 95	.....
Ohio.....	33	86	51	22	72	61	53	05	6 52	.....
Michigan.....	38	85	48	27	64	48	48	.....	8 49	.....
Indiana.....	27	81	51	20	89	63	47	03.5	6 06	.....
Illinois.....	25	75	41	18	53	55	46	04	6 14	.....
Wisconsin.....	29	67	41	20	58	50	46	.....	6 57	.....
Minnesota.....	29	51	41	23	41	54	28	.....	4 73	.....
Iowa.....	16	50	35	13	33	51	26	.....	3 60	.....
Missouri.....	26	67	41	18	54	52	38	05	6 43	.....
Kansas.....	19	59	31	17	31	66	44	.....	3 27	.....
Nebraska.....	16	49	24	17	33	.....	23	.....	3 29	.....
California.....	.....	1 03	.....	69	65	.....	98	.....	12 61	.....
Oregon.....	92	92	72	50	62	1 25	60	.....	12 00	.....

NUMBERS AND PRICES OF FARM STOCK.

HORSES.

Horses increased about 3 per cent., only two States, Massachusetts and Tennessee, falling below 100. The Atlantic coast States, from Maryland northward, about hold their own. The Southern States report a small increase, as also do the States north of the Ohio River. West of the Mississippi and on the Pacific coast the increase is very decided, especially in the newer States and Territories. Prices have continued to decline. During the last five years the average price of horses over three years old has fallen off about 36 per cent. in the New England States; 35 per cent. in the Middle States; 30 per cent. in the South Atlantic States; the Gulf States about 38 per cent.; Southern inland States 36 per cent.; the States north of the Ohio River, 21 per cent.; the States west of the Mississippi, 20 per cent.; the Pacific coast States, 10 per cent. (See Table A.) The rapid movement of population westward, and the consequent settlement of the vacant areas of the Western States and Territories accounts for the smaller decline of values in this region. A home market for horses has thus been created. Taking the whole country together, the decline has averaged about 25 per cent. The following extracts from our correspondence will show the local aspects of this branch of production:

MAINE.—*Cumberland*: Fewer colts raised than usual, and not as many horses sold to go out of the county; with prices lower than last year. *York*: There are many good animals in the county, but the average is reduced by broken-down city nags.

MASSACHUSETTS.—*Berkshire*: The number reduced on account of dull times; going back to old prices.

NEW YORK.—*Westchester*: Very few raised in this county.

NEW JERSEY.—*Atlantic*: Considerable interest manifested in raising fine-blooded colts, which will bring up the general average. There has been a disease, having the form of pneumonia, and in some cases has proved fatal; and also some instances of epizootic. *Burlington*: Because of low prices of farm produce, farmers have not replaced lost animals, and

we ought to mark below 100. *Cape May*: Many have died, but are quickly replaced, being convenient to Philadelphia. I think the percentage remains about the same. *Warren*: The total number remains unchanged, but their value is reduced.

PENNSYLVANIA.—*Bucks*: More kept now than formerly, as the low price has induced many farmers to purchase on speculation. *Northampton*: The number in the county at present is greater than I have known it, with great variation in price.

MARYLAND.—*Caroline*: Have depreciated in price about 20 per cent. since last January. Not as many raised in county as formerly, the greater number introduced from elsewhere; the prices of good farm animals being less than at home.

VIRGINIA.—*Halifax*: More attention is being paid to the raising of good farm horses. *Prince William*: No sale, except for very fine animals. *Chesterfield*: Our stock has been very much improved during the past twelve months by stallions brought from the North and West. I presume at least 200 have been introduced.

NORTH CAROLINA.—*Tyrrell*: But few raised in this county, yet the number is always kept up. *Nash*: The number of horse colts has decreased, it being developed that mules can be raised to better advantage.

SOUTH CAROLINA.—*Orangeburgh*: Very few raised in the State, nearly all brought from the West.

GEORGIA.—*Telfair*: But few raised, and those very poor. *Troup*: Not many raised in this county. *Early*: Few raised, and none for sale; many brought from Kentucky.

ALABAMA.—*Baldwin*: Very healthy, and in good condition generally.

MISSISSIPPI.—*Rankin*: Only ponies raised here.

LOUISIANA.—*Caddo*: Fully 5 per cent. decrease in numbers, owing to the failure in the cotton crop. *Cameron*: Nearly all horses here are unbroken. This class is referred to above; those broken are from 200 to 300 per cent. higher. *Franklin*: Quite a number have died from disease, generally charbon.

TEXAS.—*Mason*: An increase of about 50 per cent. in the number. Our native ponies are being improved by American horses. *Austin*: Cheaper, perhaps, than ever before, there being hardly any sale unless well broken, and then sell very low. *Van Buren*: The decrease in number is attributable in some extent to ravages of disease, but also to the fact that the mule is growing in favor with our people. There is a decrease of about 7 per cent. *Medina*: The number has fallen off 10 per cent. during the year, the result of a new disease. Several large raisers have lost half their stock. The afflicted animal shows signs of fever, loses flesh, trembles, staggers, and dies in a week or ten days. I think it an affection of the spinal marrow. I will study this disease carefully and report to the department the result of my researches.

ARKANSAS.—*Franklin*: A small increase during the last year.

TENNESSEE.—*Monroe*: Many valuable animals dying from "blind staggers," caused by eating worm-eaten corn, or worm dirt. *Van Buren*: They are being bought up and driven to the southern markets, and farmers are less interested in raising colts than formerly, consequently the decrease.

WEST VIRGINIA.—*Pleasants*: But few good horses; mostly scrub stock raised. *Greenbrier*: Owing to low prices, are not being bred as extensively as usual.

KENTUCKY.—*Lincoln*: Exceedingly dull market; no demand from the South.

OHIO.—*Logan*: The exact number of horses in this county in 1877, 9,167, and in 1878, 9,442. *Williams*: Not raising so many as usual, but fewer sales, and number holding about the same. *Wyandot*: Number reported by assessor last spring, 8,134. *Clark*: Plenty of horses, but no sale; hard to establish a price for them. *Delaware*: The number now in the county, 8,763. *Allen*: The quality rather above the average, the French Norman taking the lead. *Lucas*: Farmers raising a larger and heavier class of horses than heretofore. *Butler*: Number assessed for 1878, 11,442; value, \$680,137.

MICHIGAN.—*Branch*: Horses low. *Hillsdale*: Very little sale; difficult to fix prices. *Menominee*: Not many raised; the supply kept up by importations from other States. *Clin-ton*: Have increased until the county is quite heavily stocked, but generally of an inferior quality. *Saginaw*: A great many heavy horses brought here for lumbering purposes from Canada, Ohio, and other places; prices for such stock from \$125 to \$225.

ILLINOIS.—*Kankakee*: The assessor's books show 422 in this county. *Lee*: Small decrease in the number during the past year. *Mason*: Our best horses bought up for eastern markets; the remainder, of all ages, low. *Ogle*: No regular market, and difference in quality, make an estimate of prices difficult; all animals in good condition.

MINNESOTA.—*Ramsey*: Total from assessor's returns, 2,000. *Wright*: A surplus and little call; heavy horses in good demand. *Le Sueur*: Some improvement; the Norman horses held very high.

WISCONSIN.—*Walworth*: Horses have increased. *Douglas*: Our horses a mixed breed of Indian and French ponies; very few first-class horses. *Dunn*: Increase largely due to shipment from Illinois to take the place of oxen on newer farms. *Jackson*: A large decline in prices, owing to badly damaged hay; not worth over 66 per cent. of last year's prices. *Pepin*: Number of horses, 1,634; value, \$87,050.

KANSAS.—*Kingman*: Do not do well until they have been in the county two years; mostly a small class of horses. *Labette*: Not of valuable blood; mixed with Indian pony. *Mitchell*: Have increased by breeding and importation. *Graham*: Increased by emigration.

MISSOURI.—*Holt*: Total number, as per assessor's report, 6,100. *Pettis*: Free from disease and doing well. *Platte*: No demand; have become almost valueless. *Taney*: The number on assessor's books, 1,871. *Mercer*: Total number, 7,220; value, \$248,350.

NEBRASKA.—*Antelope*: Serviceable horses have not depreciated, but the average low, owing to the great number of Texan and Oregon ponies.

NEW MEXICO.—*Colfax*: Three distinct classes—Mexican pony, Californian, and American horses; the two former of the least value; the prices given less than the average of American horses.

CALIFORNIA.—*Plumas*: The average price of horses under three years greater than over that age, because mustangs are not now raised. *Yuba*: More American horses between two and three years old than usual; the old ones include the Spanish stock on hand.

OREGON.—*Marion*: Badly run down for the last fifteen years, owing to a mania for small trotting horses, but the stock improving now. *Grant*: About 1,000 horses killed and stolen by Indians during last summer's raid, and but very few have been recovered; this reduces the percentage.

COWS AND CATTLE.

Cows show an increase in nearly all the States. The only States reporting a decline are Pennsylvania, Maryland, Virginia, Florida, Louisiana, Texas, and Tennessee, each 99. The States showing greatest increase are Nebraska, 123; California, 118; Minnesota, 112; Michigan and Kansas, 111 each; Oregon, 110. Prices have declined in all the States; in some instances the decline is considerably over one-third.

Cattle are about equal in number to last year. The greatest decline, 10 per cent., was in Rhode Island; the greatest increase, 23 per cent., in Nebraska. Prices have also declined.

The table at close of article will give details of prices and numbers.

MAINE.—*Piscataquis*: There is a large increase in numbers of cattle, principally steers. *York*: Farmers have reduced their stock in order to get money and avoid buying corn. *Cumberland*: Quite a demand for cows to go out of the county.

VERMONT.—*Orleans*: Cattle bought up closely by drovers, and nearly all in poor condition.

MASSACHUSETTS.—*Berkshire*: The number has increased slightly, notwithstanding the low prices of butter and cheese.

NEW YORK.—*Saint Lawrence*: Valued at a little higher than last year on account of dropping their calves earlier. *Westchester*: Good grades are in demand; a fine milker will bring \$75.

NEW JERSEY.—*Burlington*: Our winter has been favorable for stock, many farmers being able to pasture into December. *Warren*: Value depreciating.

PENNSYLVANIA.—*Bucks*: More kept now than ever before, as the many railroad facilities

for shipping milk to Philadelphia render them more profitable than formerly. *Sullivan*: The percentage of numbers has been reduced in consequence of low price of dairy produce. *Westmoreland*: The Alderney stock has lately been introduced and is highly prized for dairy purposes. It is doubtful, however, whether it will long maintain its preference over the improved Short-Horn as profitable farm stock.

VIRGINIA.—*Dinwiddie*: Numerous and exceedingly cheap. *Chesterfield*: There is quite a demand for cows, with an evident desire to improve the stock by crossing with Alderney, Ayrshire, and Jersey bulls. *Halifax*: All farm animals have gone into winter quarters in better condition than usual. *Northampton*: Depression in financial matters has depreciated all kinds of stock.

NORTH CAROLINA.—*Jackson*: All stock generally healthy and in good condition. *Iredell*: All kinds of stock compare favorably with last year in general condition and numbers, but with prices low owing to scarcity of money. There is an increasing disposition on the part of farmers for the introduction of improved breeds. We have received some very fine stock during the year, but the success in breeding is yet to be developed. *Yadkin*: Stock of all kinds cheap. *Caldwell*: Prices of all stock are very low, with but few sales. *Stanly*: Farmers of this county have provisions in advance for the ensuing year, with prices low. We are beginning to feel more interest in seeds sent from the department. *Buncombe*: All kinds of stock increasing, except hogs, which remain about as last year owing to cholera and low price of pork.

SOUTH CAROLINA.—*Colleton*: The quality and condition of cattle have been very much improved during the past year. *Lexington*: All kinds of stock lower in value than since the war.

GEORGIA.—*Cobb*: Stock of all kinds very cheap; can be bought for less than for sixteen or eighteen years past. *Jefferson*: This has been altogether a remarkably propitious year; abundant crops, and farmers amply supplied for the coming winter with meat cheaper than ever before.

FLORIDA.—*Suwannee*: Cattle run loose in pine woods and are bought and sold, in lots both old and young, at so much per head regardless of age; cows decreasing; but little improved stock brought into the county. *Columbus*: All kinds of stock have declined during the year and are now as cheap as I ever knew them.

MISSISSIPPI.—*Lowndes*: There is a marked improvement in stock in our county. Many of the improved breeds of hogs, sheep, and cattle have been introduced, the low price of cotton having caused many to turn their attention in this direction. *Smith*: Stock generally in better condition than last year, with lower prices.

TEXAS.—*Anderson*: All stock above an average condition. *Lavaca*: Stock in fine condition. *Red River*: Stock of all kinds abundant and prices low.

ARKANSAS.—*Franklin*: All stock remain about as usual in numbers, owing to the stringency in money matters; with prices very low. *Prairie*: It is almost impossible to make a correct estimate of the price of stock, as there is scarcely any sale even on a year's time. Herds are offered at little more than half of last year's prices. I saw one hundred sell that did not average \$4.50 per head.

TENNESSEE.—*Knox*: The general condition of all kinds of stock is better than it has been for many years; no disease prevailing, while numbers are increasing and quality improving. *Henderson*: Stock generally better cared for than formerly, the result of reading agricultural works. *Unicoi*: Very hard winter on stock generally, but they have stood it very well, being in fine condition at the beginning. *Dyer*: The demand has been very great in this county for the past twelve months. Very few beef cattle in the county. *Meigs*: During the past year stock of all kinds have declined nearly one-third in value, and sales are more difficult to be made.

WEST VIRGINIA.—*Pleasants*: Oxen scarce; stock-cattle very scarce, owing to sale of young calves; slow sale for fat steers, and price but little in advance of stock cattle. *Greenbrier*: The number up to standard; more young cattle sold than usual, and brought better prices than older stock.

KENTUCKY.—*Lincoln*: Exceedingly dull; no demand.

OHIO.—*Logan*: The exact number in 1877 was 17,450, and in 1878, 17,099. *Pickaway*:

Good calves and yearlings in better demand than other cattle. *Vinton*: Very few steers kept till three years old except oxen. *Wayne*: Fine cattle in good demand. *Wyandot*: Number reported by assessor last spring, 14,611. *Clark*: Milch cows in demand at from \$45 to \$75. "Jerseys" becoming plenty, but the "Short-horned" more generally raised. *Delaware*: Number in this county, 24,427. *Paulding*: Some falling off in cattle of all grades, except milch cows. *Allen*: More has been done for the improvement of cattle the past season than ever before. Short-horn Durham and Jersey breeds have been introduced. *Butler*: Number assessed for 1878, 16,404; value, \$357,757.

ILLINOIS.—*Greene*: Not as many forward cattle as usual by half. *Hardin*: Prices lower than for twenty years. *Lee*: Milch cows largely increased; stock cattle greatly diminished. *Clark*: But few beef cattle being fed this winter. Hundreds of young cattle have been sold or taken to other counties where the corn crop is better. *McLean*: Average price of cattle over three years old placed high, owing to their being corn-fed at that age.

INDIANA.—*Steuken*: Selling at \$2.25 per cwt. *Franklin*: More raised now than some years ago.

WISCONSIN.—*Richland*: Cattle of all kinds bought up and drove off. *Walworth*: Cattle have increased. *Pierce*: Fall feed and pasture being excellent, cattle and all stock went into winter in fine condition. *Douglas*: Working cattle, heavy enough for the "lumber camps," bring a good price; other cattle low. *Dunn*: A falling off in cows, due to the rapid fencing of wild lands by new settlers; also to low price of butter. *Jackson*: A large decline. Not worth over 66 per cent. of last year's prices. *Pepin*: Number of neat cattle, 5,042; value, \$61,135.

MINNESOTA.—*Ramsey*: Number from assessor's returns, 3,000. *Rock*: A decrease in the number of oxen. *Sibley*: Decreased in numbers on account of the fence law. *Stearns*: All domestic animals pretty well sold off in 1876 on account of the grasshoppers. *Steele*: Great stagnation in prices. *Wright*: Good beeves quick at low prices. *Le Sueur*: Farmers getting a better stock of cattle.

IOWA.—*Guthrie*: A great many died of some strange disease, generally supposed to be caused by corn smut. *Howard*: More sold than usual, reducing the percentage.

MISSOURI.—*Holt*: Total number, as per assessor's report, 18,000. *Jefferson*: Most of the neat cattle bought up in the fall at 2½ cents on foot. *Pettis*: Doing well; have increased in numbers but not in price. *Platt*: More attention paid to raising cattle than usual. *Taney*: The number on assessor's books, 4,318. *Mercer*: Total number, 18,528; value, \$224,097.

KANSAS.—*Mitchell*: Not held in as large herds as formerly on account of the scarcity of open land. *Graham*: Emigration has decreased the number of cattle. Stock men have been obliged to move west.

NEBRASKA.—*Richardson*: A good many young cattle died of eating too much smut in the cornfields. *Cass*: Stock cattle dying of dry murrain to a considerable extent; thought to be caused by dry husks and prairie grass; weather very cold. *Antelope*: Several large herds brought into the county the past season. More attention paid to raising cattle.

CALIFORNIA.—*Plumas*: The dairy business increasing. The raising of beef incidental and secondary.

OREGON.—*Grant*: Reduced in numbers by Indian depredations. *Marion*: Low minimum; surplus sent to the natural pasture lands east of the Cascade Mountains. *Douglas*: Steers unbroke worth \$15 to \$25, and the same animals if broken to work worth \$40 to \$60.

SHEEP.

The number of sheep has increased about 5 per cent. There is a small decline in the Middle States, but all other sections of the Union show an increase, especially the Gulf States, which have advanced 13 per cent. The largest rates of State increase are 44 per cent. in Nebraska, 25 per cent. in Kansas, and 23 per cent. in Minnesota. The States showing a decline are New Hampshire, New Jersey, Pennsylvania, Virginia, Indiana, Illinois, and Iowa, which

fall 1 or 2 per cent. below last year. Prices show a decline on the whole, but not so great as in other kinds of farm animals. The Pacific States show a positive increase, as also does Pennsylvania.

The following notes from correspondence are appended:

MAINE.—*Piscataquis*: Have not been able to ascertain the real number killed by dogs, but there have not been many.

VERMONT.—*Washington*: This interest is greatly improving, notwithstanding the low price of wool.

MASSACHUSETTS.—*Berkshire*: The number increasing; wool low, but good mutton commands a fair price.

NEW YORK.—*Delaware*: No means of ascertaining the exact number killed by dogs, but set it at 300 for 1878. *Saint Lawrence*: Valued a little higher than last year; no means of getting at the number killed by dogs. *Allegany*: The number is increasing in this county. I have heard of but three being killed by dogs. *Madison*: But few kept, and those for mutton only; dogs too numerous.

NEW JERSEY.—*Salem*: There have been many killed by dogs in this immediate locality. *Warren*: About the same number. Early lambs brought \$4, at four and five months old. *Somerset*: The tax arising from damages by dogs amounted to about \$2,000 for this county. The number killed can only be estimated. *Hunterdon*: The number killed by dogs during the year is estimated at about 1,100; we have no positive data.

PENNSYLVANIA.—*Centre*: Many have been killed by dogs during the year, but it is impossible to give exact number; about 200. *Sullivan*: This industry yields the most encouraging profits.

MARYLAND.—*Caroline*: The most profitable stock that we have; much interest is being displayed in this industry. *Montgomery*: The number remains about the same as last year. Farmers are deterred from increasing their flocks from the fear of dogs; fourteen were recently killed on an adjoining farm to mine. No county in the State has superior advantages for sheep husbandry. *Charles*: A large percentage destroyed by dogs; in one instance the entire flock, consisting of forty odd, highly improved, and very valuable.

VIRGINIA.—*Halifax*: This industry does not receive the attention that it merits on account of the rapacity of worthless curs. *Prince William*: Fewer killed by dogs than any year since the war. We have improved laws, and other ways and means of protecting our flocks. *Dinwiddie*: This industry is improving. The farmers have taken the dog law in their own hands, and it is rarely you hear of a sheep being killed by a dog. *Brunswick*: Loss from dogs very small compared with former years. There are about 3,425 in the county. *Chesterfield*: Have not improved as much as we wish, but we have some very fine Cotswold and Southdown bucks with which to effect the improvement. *Gloucester*: The losses by dogs are not so great or so general as heretofore; very few reported.

NORTH CAROLINA.—*Cherokee*: Great mortality among our flocks from dogs. *Hyde*: The number killed by dogs is very small. *Nash*: This industry is increasing in importance. Some large plantations that have been devoted to cotton, have been seeded in grass and clover for sheep. *Caldwell*: Statements vary so in regard to number killed by dogs that I will only estimate it at about 10 per cent.

GEORGIA.—*Gwinnett*: Very few raised here except for family use, the worthless cur being the sole cause.

FLORIDA.—*Suwannee*: Increasing in numbers and improving in kind. From the best information I can gather there are from 1,000 to 1,200 in the county, and 10 per cent. is the annual loss from dogs. They run loose in the pine woods, and are bought and sold in lots regardless of age. *Santa Rosa*: Fewer killed by dogs during the past year than usual.

ALABAMA.—*Baldwin*: No general disease; some few have scab; mortality by dogs not so great as last year.

MISSISSIPPI.—*Prentiss*: I have no means of ascertaining the exact number killed by dogs, but from the best information I can derive I would set it down at 300. *Jefferson*: Large increase in numbers; mutton worth in market 12½ cents per pound.

LOUISIANA.—*Franklin*: Mortality by disease is greatly in excess of the loss sustained from dogs.

TEXAS.—*Victoria*: The loss of lambs and old ewes unusually large, supposed to be owing to excessive rains. *Menard*: Many destroyed by wolves, but very few by dogs; the former are rapidly decreasing in numbers, the result of a poisoning process. *Mason*: Have increased about 100 per cent. in numbers: killed only by wolves. *Austin*: Only about 2,000 in the county, and as the stock law is in force in some sections, this number will decrease. *Van Buren*: Increasing in numbers and favor since the farmers find a ready sale at the fairs for all the wool. *Titus*: The low percentage of killed by dogs is attributable to the passage of a stringent dog law. *Medina*: Number increasing, owing to the great advantages afforded by our waste prairies and favorable climate, both of which are now being turned to account. Number killed by dogs very small, the result of having experienced herders.

ARKANSAS.—*Montgomery*: Have no data as to the number killed by dogs; it is, however, small. Wolves and wild cats are the chief enemies, and even their depredations are not serious. *Fayette*: Sheep-raising rendered almost impracticable on account of the great numbers of worthless curs; every negro keeps from two to six.

TENNESSEE.—*Bradley*: I cannot give exact figures as to number killed by dogs, so must estimate from different authorities, and set down at 100. *Knox*: Since dogs have been restrained, sheep begin to appear on almost every farm. Farmers begin to appreciate the policy of cultivating more grass for this industry. *Van Buren*: We have the best county in the State for this industry, but there is little attention bestowed, owing to inefficient protective laws and an army of ravenous dogs.

WEST VIRGINIA.—*Jefferson*: Receiving more attention, and dog ravages less than at any time since the close of the war. *Greenbrier*: Being raised more extensively every year. No depredations by dogs.

KENTUCKY.—*Lincoln*: Prices maintained better than other live stock. *Shelby*: Sheep husbandry largely on the increase.

ILLINOIS.—*Hardin*: Not so many sheep as last year; about 50 killed by dogs. *Kankakee*: 27,022 assessed. No data as to the number killed by dogs. *Lee*: Have increased, and would increase largely but for dogs killing them. *Clark*: The loss of sheep by dogs, and the low price of wool, have caused a reduction. *La Salle*: None killed by dogs; perhaps 50 killed by wolves. *Pope*: No reliable data for the number killed by dogs, but the number much less than in years past.

OHIO.—*Logan*: The exact number in 1877 was 51,434, and in 1878, 53,241; the value of sheep killed and injured by dogs, \$1,381. *Pickaway*: The percentage a little larger; about 300 killed by dogs. *Union*: Sheep keeping up better than other stock, and less killed by dogs. *Wayne*: Sheep dull. *Wyandot*: Number reported by assessor last spring, 64,019; number killed by dogs, 232. *Ashtabula*: The quality very much improved, principally by crossing with large mutton breeds; dogs assessed; proceeds applied to payment for sheep killed and injured; about 150 sheep paid for the past year. *Clark*: Not raised as in former days, on account of low prices of wool and fear of dogs. *Delaware*: Number in the county, 107,968. *Allen*: Sheep are beginning to look up since the passage of the Ohio "dog law." *Butler*: Number assessed for 1878, 9,448; value, \$28,307.

MICHIGAN.—*Branch*: More uniform in price than other stock; very few killed by dogs; probably 50 in the whole county. *Delta*: Sheep do well here; none killed by dogs. *Clinton*: Less in number, though very much improved in quality; more interest taken in them than in any former year; only 25 killed by dogs during the year. *Saginaw*: More killed by dogs the past year than usual, but no exact data.

WISCONSIN.—*Marquette*: A great many killed by wolves, probably three times as many as killed by dogs; many selling out and will not keep them on account of the destruction. *Watworth*: About stationary in numbers. *Waushara*: Wolves killed most of the sheep in this county. *Door*: Sheep-raising backward through fear of dog depredations. *Douglas*: None killed by dogs; a few killed by wildcat or lynx. *Pepin*: Number in the county, 2,607; value, \$3,854.

MINNESOTA.—*Jackson*: Wolves have made sad havoc among sheep in some parts of the

county. *Steele*: The depredations of wolves and dogs prevent the rapid increase of flocks. *Le Sueur*: About 100 killed; probably over half by wolves. *Pope*: Not numerous in this county; none killed by dogs.

IOWA.—*Floyd*: But few sheep, and sheep husbandry diminishing.

MISSOURI.—*Madison*: A large percentage killed by dogs; county admirably suited to sheep-raising. *Lawrence*: About 10 per cent. killed by dogs; no fatal disease among them. *Perry*: Raised for wool and breeding purposes, and good lambs worth as much as old sheep. *Pettis*: Free from all disease; the only noticeable loss that caused by dogs. *Phelps*: Dogs and wolves the great drawback to successful sheep raising. *Platt*: More attention paid to raising sheep than for many years past. *Taney*: The number on assessor's books, 5,499. *Mercer*: Total number, 18,953; value, \$24,500.

KANSAS.—*Labette*: Sheep industry, though in its infancy, is on a rapid increase. *Lyon*: The increase of flocks during the last eighteen months very flattering to the owners. *Mitchell*: Sheep husbandry steadily gaining; sheep almost entirely free from disease, and require but little prepared food or expensive shelter.

NEBRASKA.—*Hamilton*: Only 447 head of sheep in the entire county according to assessment records. *Wayne*: Several large flocks have been brought into the county this season, hence a large increased percentage. *Webster*: Sheep healthy; no foot-rot or scab among them.

NEW MEXICO.—*Doña Ana*: Native, hardy, and free from disease, and produce a small amount of coarse wool; a good stock to build upon.

CALIFORNIA.—*Trinity*: A good many raised in the south part of this county. *Merced*: On the decline, owing to the scarcity of feed.

OREGON.—*Marion*: Stock low, owing to the surplus being sent east of the Cascade Mountains. *Grant*: Reduced in numbers by Indian depredations.

DAKOTA.—*Lawrence*: Suffered severely by snow-storm of last March; large flocks smothered.

HOGS.

The prices for hogs received in January, 1879, are ruinously low. The records of this Department since its formation have never shown so low a price. Only in a few of the extreme Northeastern States, where the home consumption exceeds the production, does the price hold a fair comparison with the price of previous years. The number, as compared with those returned January, 1878, shows an increase of about 5 per cent., which is mainly caused by large increases in States west of the Mississippi River, the States of Illinois, Indiana, Ohio, and Kentucky remaining nearly the same as last year.

Reference to table appended will give the prices of hogs in each State on January 1, 1879.

MAINE.—*Cumberland*: But little interest is taken in raising pork, as there is no remuneration at its present price.

NEW HAMPSHIRE.—*Sullivan*: Pork very low; dressed, \$4.50 per hundred pounds.

MASSACHUSETTS.—*Berkshire*: Stock pigs from four to six weeks old have sold at an average of \$1.25; salted pork at \$5 per hundred pounds; present price, \$4.50.

NEW YORK.—*Saint Lawrence*: Very cheap in this county. *Westchester*: Selling now at \$4 and \$5 per hundred weight.

NEW JERSEY.—*Burlington*: The very low prices (the lowest we have ever known) and losses from disease have occasioned reduction in numbers. *Warren*: Number unchanged, but price reduced.

PENNSYLVANIA.—*Northampton*: Lower than ever before known; selling now at \$4.50 per hundred weight. *Sullivan*: Large decrease in the percentage, owing to low prices and no beechnuts. *Armstrong*: Pork is but 2 cents per pound; less than at same time last year.

VIRGINIA.—*Cumberland*: The cholera prevailed to such an extent in this and adjoining counties last fall that our stock hogs have been reduced, so that I fear our next year's killing

will be a poor one. *Halifax*: Generally healthy, and more attention is being paid to them. *Prince William*: They scarce pay for the corn they consume, with no margin for profit. *Amherst*: The falling off in numbers is due to the prevalence of cholera in a portion of the county. *Dinwiddie*: Very little cholera this season, and an increase in numbers. The majority of our people raise an abundance of pork for home consumption. *Chesterfield*: Our stock is rapidly improving; there are now more fine-grade boars in the county than I ever knew.

NORTH CAROLINA.—*Hyde*: There is a reduction in the number, owing to very low prices of pork and bacon and too short corn-crops in this section. *Tyrrell*: Owing to the low price, there is but little interest manifest in raising pork. *Yadkin*: Cholera still prevailing. *Nash*: The number is increasing. *Lincoln*: Pork extremely low; hard times the cause. *Jackson*: General condition better than usual.

SOUTH CAROLINA.—*Colleton*: We have lost many with cholera during the past year. *Chester*: A marked improvement of interest is being manifest in this direction. One of our farmers a few days since slaughtered one of his own raising that netted 1,158 pounds. *Orangeburg*: Farmers generally are giving more attention in this quarter than formerly; we have some very fine stock.

GEORGIA.—*Gwinnett*: Better cared for now than any time since the war; but Western pork can be bought cheaper than we can raise it. *Warren*: We have no disease, and if farmers continue to plant grain, in a few years will raise enough for home consumption.

FLORIDA.—*Suwannee*: But few own any other than "wind splitters," which are more of an expense than profit. A few are now introducing improved breeds, and I hope soon to have a better report in this line.

ALABAMA.—*Baldwin*: Very healthy; receive less attention than any other stock.

MISSISSIPPI.—*Jefferson*: Large increase in numbers. *Lauderdale*: More now than ever before. Many farmers raise all their own pork. Pork only 4 cents per pound.

LOUISIANA.—*Franklin*: Many died from some unknown disease, which was generally termed cholera.

TEXAS.—*Fort Bend*: This interest is receiving increased attention, and the number in the county is augmenting rapidly. *Austin*: Large numbers and very cheap—pork selling as low as 5 cents per pound, the lowest ever known in this county. *Fayette*: Thousands destroyed by cholera this year. *McLennan*: The prices have fallen off about 50 per cent. since January, 1878. *Nueces*: Very few raised, and those by butchers at Corpus Christi.

ARKANSAS.—*Fulton*: Cholera so fatal in portions of county that but few are left for selling. Some who lost their entire stock are afraid to buy more, lest they also be taken. *Marion*: Until last summer we had little or no cholera; during the summer and fall we lost at least 40 per cent. *Van Buren*: Number increasing, though cholera is reported throughout the eastern portion of county. *Franklin*: Have heard of but few cases of cholera during the last year. General good health has prevailed, hence quite a marked increase in numbers, with introduction of improved breeds.

TENNESSEE.—*Knox*: But little cholera during the past year. *Dyer*: The cholera has made its appearance in different parts of county, and I look for great mortality among them, as the price of pork has got so low that the farmers say it does not pay to feed, and will take no precautions to prevent them from dying; beside, the prospect of a very hard winter.

KENTUCKY.—*Lincoln*: Not much interest taken in raising hogs.

WEST VIRGINIA.—*Jefferson*: The number of stock hogs reduced by cholera last summer. *Pleasants*: Hogs a drug; pork selling at \$3 per cwt. net. *Greenbrier*: Owing to low prices, not bred as extensively as usual.

OHIO.—*Logan*: The exact number in 1877 was 37,278, and in 1878, 34,606. *Monroe*: Fat hogs selling at \$2.25 and \$2.50, gross weight. *Pickaway*: Fat hogs \$2.25 to \$2.50 per cental gross; stock \$2.50 to \$3. *Vinton*: No hogs over one year old except brood sows. *Wayne*: The best hogs \$2 to \$2.25 per cwt. *Williams*: More sold than ever before and fewer kept over. Farmers depending on spring pigs for fattening. *Wyandot*: Number reported by assessor last spring, 30,730. *Ashtabula*: But few in the county over one year old, and these fat hogs or breeding animals. *Clark*: In fine order and healthy; selling for \$2.40

gross weight. *Mahoning*: Prices ruinously low, hence have been run off. Those now on hand from one to four months old. *Paulding*: Hog crop cut short past year by cholera. *Allen*: As fine a selection of hogs as can be found in Northwestern Ohio. Poland China and Berkshire take the lead. *Morrow*: Hogs have not been so plenty for many years; but little disease among them. *Butler*: Number assessed for 1878, 52,706; value, \$196,020.

MICHIGAN.—*Branch*: Hogs very low. *Hillsdale*: Worth \$2 gross, and \$2.80 net. *Lenawee*: Nine-tenths fattened at less than one year old. Pork very low and farmers discouraged. Live hogs \$2.30 to \$2.35; dressed \$2.85 to \$3.10. *Tuscola*: The sheep industry growing rapidly in this county. *Charlevoix*: Butchers paying \$3.50 per cental for hogs.

INDIANA.—*Decatur*: Prices lower than for thirty years. *Grant*: Some disease among hogs, supposed to be cholera or quinsy. *Steuben*: Selling for \$2 per cental gross. *Hamilton*: Worth \$2.25 per cwt. gross. This time last year worth \$3.75. A disposition to sell off early. *Knox*: Hogs are lower than they have been for thirty years. *Brown*: Owing to low prices many have fattened nearly all their brood sows; "want no more pigs till next summer," say the farmers generally. *Franklin*: Likely to decrease until prices are better. We now lose the cost of raising and do well to get paid for the corn used in fattening.

ILLINOIS.—*Hardin*: Prices low and less slaughtered. *Kankakee*: Number assessed, 14,075. *Wayne*: The severe winter and light corn crop will reduce hogs 10 per cent. by April. Prices of hogs so low that it will not pay to buy feed for them. *Winnebago*: A great many "shoats" sold, and corn abundant; farmers shipping hogs that would pay for feeding if market prospects were better. *Carroll*: The assessor's returns show that 22,092, or about 60 per cent. of hogs, have died during the year of cholera. *Clark*: Loss by disease and the low price of pork have caused a reduction in hogs. *McLean*: A large number of pigs raised the past season, but cholera largely decreased the number. *LaSalle*: Cholera very destructive, and accounts for the decrease in numbers more than the present low prices and small profits. *Mason*: Hogs reduced by cholera and shipped earlier than usual. *Ogle*: Hog cholera not prevalent as a year ago. *Boone*: No hog cholera. All live stock in healthy condition, but extremely low.

WISCONSIN.—*Richland*: Pork very low; hogs most all butchered and sold. *Walworth*: Being sold fast to get rid of them. *Dunn*: The low price of pork has discouraged farmers; a frequent remark, "I fat my own pork and no more." *Pepin*: Number in the county, 3,182; value, \$8,188.

MINNESOTA.—*Fillmore*: Healthy and slight increase in numbers; more attention paid to breeding them than formerly. Prices lower than at any time since Minnesota produced pork. *Isanti*: Prices depressed and likely to be as there is a large crop and little demand. *Nobles*: Pigs four to six weeks old worth \$1.50. *Ramsey*: Total from assessor's returns, 1,400. *Rock*: Plentiful and a poor market; worth \$2.25 to \$2.60 per cental. *Steele*: Never so low; 2 to 2½ cents per pound. *Wadena*: Worth \$4 dressed; \$2.25 for shipping. *Le Sueur*: Reduced about one-half by sales before January.

IOWA.—*Appanoose*: Being shipped at \$2.20 per cental gross. *Delaware*: Prices lower than for fifteen years; some hog cholera, most cases fatal. *Marion*: Two dollars per hundred, and a drug in the market. *Taylor*: Worth 2 cents per pound, live weight. *Guthrie*: A great many hogs lost by cholera. *Linn*: Fat hogs range from \$1.90 to \$2 per cwt.

MISSOURI.—*Holt*: Total number as per assessor's report, 55,000. *Pettis*: Have increased in numbers, but heavy losses from cholera and other diseases. Prices range lower than was ever known here. *Platt*: A fair demand for hogs, but at prices that will not pay for raising them. *Taney*: The number on assessor's books, 16,066. *Mercer*: Total number, 32,647; value, \$55,200.

KANSAS.—*Mitchell*: The stock somewhat reduced by low prices. *Republic*: Pigs, \$1.50; shoats, \$3; stockers \$4, and fat hogs, \$5.75.

OREGON.—*Marion*: Not profitable in this county, as our cereals are too valuable for hog feed or to compete with the corn of the Northwest. *Grant*: Advances in grain owing to Indian troubles reduced the price of hogs, many farmers being compelled to dispose of their hogs for whatever they could get.

CALIFORNIA.—*Merced*: On the decline owing to the scarcity of feed.

MULES.

Mules increased about 2 per cent., Kansas reporting 22 per cent., Minnesota 14 per cent., and Nebraska 10 per cent. more than last year. A decline of 1 or 2 per cent. is noted in New York, New Jersey, Pennsylvania, Virginia, Tennessee, Kentucky, Ohio, and Oregon. The other States range from 100 to 106. Compared with five years ago prices show a still greater decline than those of horses. See notes of correspondence below.

NEW JERSEY.—*Atlantic*: But few in this county, and they average better than old horses. *Warren*: Number unchanged; but few raised here; nearly all brought from other States.

MARYLAND.—*Caroline*: Depreciated in price since January last on account of the cheapness of grain. *Montgomery*: Very few raised in this county, but many introduced from elsewhere at prices from \$100 to \$150 per head. *Worcester*: Much used and command fair prices.

VIRGINIA.—*Halifax*: Increased attention is being given to raising this animal for the farm. *Prince William*: Very few raised in this county. *Chesterfield*: But small increase in numbers, though of a better grade.

GEORGIA.—*Gwinnett*: Are considered more valuable for the farm than horses, being more hardy, less liable to disease, consuming less, and suiting better for tenants. They are superseding the ox as well. *Early*: But few raised and none for sale. Nearly all brought from Tennessee and Kentucky.

LOUISIANA.—*Caddo*: A reduction of fully 5 per cent. in numbers on account of the failure in cotton crop.

TEXAS.—*Menard*: There are a great many in use here, and are preferred to horses for all heavy work; very few raised, however.

ARKANSAS.—*Van Buren*: This animal is gradually superseding the horse, both in numbers and general favor. There is an increase of about 11 per cent.

TENNESSEE.—*Monroe*: Many dying from blind staggers, caused by eating worm dirt in the corn. *Austin*: Very low, with scarcely any sale; 25 per cent. lower than several years ago.

OHIO.—*Logan*: The exact number of mules in 1877, 326, and in 1878, 335. *Williams*: Doing a little better than horses. *Wyandot*: Number reported by assessor last spring, 134. *Clark*: Not raised to any extent here now. *Allen*: None of any consequence raised in this county. *Lucas*: Not many raised, some brought in and sold. *Butler*: Number assessed for 1878, 822; value, \$53,510.

MICHIGAN.—*Genesee*: Very few imported mules; none bred here. *Oakland*: Not kept in numbers sufficient to establish a market price.

ILLINOIS.—*Kankakee*: Enough raised to keep up the general average; prices about the same as horses. *Lee*: Slightly increased during the past year. *Ogle*: But few mules in the county, and the prices hard to estimate as there is no regular market.

MISSOURI.—*Holt*: Total number as per assessor's report, 1,800. *Lawrence*: Quite a number driven out to the cotton-growing States. *Pettis*: Free from disease and doing well. *Platt*: More attention paid to raising mules now. *Taney*: The number on assessor's books, 366. *Mercer*: Total number, 762; value, \$28,494.

KANSAS.—*Kingman*: Better adapted to this country than horses. *Labette*: Rapidly taking the place of horses and oxen on the farm. *Mitchell*: Have multiplied by natural increase and importation. *Graham*: Increased by immigration.

WINTER GRAIN.

The acreage in winter wheat shows a slight increase over last year. The New England States, Gulf States, and the States north of the Ohio River report a larger area, especially Illinois, where there is an extensive transfer of this

industry from spring to fall sowing. The Middle States, South Atlantic Coast States, and Southern Inland States show a decline. West of the Mississippi, in spite of a considerable increase in Kansas and Nebraska, the aggregate area has been reduced. On the Pacific coast, Oregon reports a decline of 6 per cent. California wheat, in the census report, was all returned as spring wheat. It is properly winter-sown wheat. It would be well to designate as fall wheat what is generally called winter wheat east of the Rocky Mountains. We would have then three convenient designations—fall, winter, and spring wheat—to indicate the sowing of each crop. The crop of California is not included in the above estimate.

The condition of the growing crop on the 1st of December was not very promising, especially for early sowings. Complaints of injuries by the Hessian fly (*Cecidomyia destructor*) have been received from different sections of the country. East of the Mississippi and on the Pacific coast early sowings were in many cases embarrassed by drought. West of the Mississippi, especially in Missouri and Kansas, early sowings enjoyed the better growing conditions, and hence are more promising.

The area in winter rye has fallen off about 1 per cent. on the whole. The Atlantic States, Southern Inland States, and the States north of the Ohio River have declined, as have also all the States west of the Mississippi, except Kansas, in which the increase nearly counterbalances the net decline of all the other States.

The following extracts from correspondence are given:

NEW YORK.—*Genesee*: Injured by the Hessian fly. *Ontario*: Just sprouting, and shows well. *Oncida*: Increased area. *Wayne*: Hessian fly very injurious.

NEW JERSEY.—*Somerset*: Almost totally destroyed in some fields by the Hessian fly, and seriously injured everywhere in the county.

PENNSYLVANIA.—*Armstrong*: Being injured by the Hessian fly. *Beaver*: Not so large an area sown this fall as last; some fields injured by the fly. *Indiana*: Acreage not so large as usual, on account of dry weather; ground too hard to be plowed in season. *Butler*: Infested by the fly to such an extent that no idea can be had as to true condition before spring. *Lawrence*: The month of November has been favorable to late sowing; the early seeded has been sadly damaged by the fly, some fields being almost destroyed. *Tioga*: Never saw it look more promising at this season. *Bucks*: Much of it drilled in connection with fertilizers, and dry weather succeeding prevented some from germinating. *Cameron*: September and October being very wet the area sown is somewhat less than 1877, but present indications are favorable for good crop. *Berks*: Seeding delayed on account of unfavorable weather; it is now looking thin and rather unpromising. *Lehigh*: Generally seeded late, but looking well, as we have had favorable weather since planting.

MARYLAND.—*Wicomico*: Not seeded until late in fall, on account of dry weather, and looks unpromising; the acreage increasing yearly. *Harford*: Early droughts injured the growing crop, but late rains are bringing it out; area increased. *Washington*: Germination retarded by drought.

VIRGINIA.—*Rockingham*: The early sown does not look as healthy and vigorous as that sown later; the fly has injured the early in some parts of the county. *Greenville*: Some are still seeding; that sown in October is looking very well. *Orange*: Owing to unfavorable planting season it is not looking as well as might be expected, considering early seeding, although it is evidently healthy.

NORTH CAROLINA.—*Nash*: Later than usual in seeding, and not doing well on account of dry weather. *Stanley*: Just coming up, and looks vigorous. *Dunlap*: From the best informa-

tion I can gather, there is not more than 75 per cent. of last year's acreage sown. *Perquimans*: Looking well; sown in good time. *Forsyth*: Prospects good.

SOUTH CAROLINA.—*Lexington*: Part of the crop just coming up; many still sowing; that seeded early looks well and bids fair to excel the last crop.

GEORGIA.—*McDuffie*: Crop looking well and weather favorable. *Jackson*: Very large area being sown.

TEXAS.—*Burnet*: Seeding has been delayed on account of dry weather; much is not yet up. *Medina*: Owing to continued drought, from August to November, there has been little sowing, as the farmers could neither plow nor till the soil until last week; there will be a larger area sown this fall than in 1877.

ARKANSAS.—*Pope*: Indications good; many are still seeding.

TENNESSEE.—*Smith*: The crop is now looking well, but it is subject to many changes. *Lincoln*: The fly is now at work, and the indications are they will do much injury to the crop. *Union*: Seeded late and looks badly. *Weakley*: Backward, but looks well.

WEST VIRGINIA.—*Taylor*: Sown late, but fall favorable, and the crop looks well. *Wood*: The wet season fine for wheat sown this fall.

KENTUCKY.—*Nicholas*: Crop sown late, but looking well; probably not forward enough to stand a severe winter. *Shelby*: The plowing of fallow and clover lands delayed from two to four weeks by drought, consequently crop sown late. The plant too young and tender to stand a hard winter, although recent rains have been favorable to its growth. *Pendleton*: The growing crop has not received as good a start as usual. *Scott*: Fall grain looking well, and the acreage increased.

OHIO.—*Hocking*: The crop has made a good start, and will be in good condition for winter. But little complaint of the fly. *Sandusky*: Not as much wheat sown this fall as last, on account of wet weather. *Gauga*: Farmers have sown all the land in wheat this fall that they were able to fertilize. *Lorain*: Recent heavy rains will injure wheat where not sufficiently ditched. *Montgomery*: Winter wheat had a favorable fall, and never looked better. *Perry*: A greater area sown to winter wheat than usual, and is looking well, except some of the early sown that has been injured by the fly. *Portage*: The heavy crop and low prices of 1878 have narrowed the acreage of the fall sowing.

MICHIGAN.—*Charlevoix*: Winter wheat never looked better, and never so large an area sown in the county. *Emmet*: Winter wheat looks remarkably well. *Mason*: Winter wheat promising. *Muskegon*: Winter wheat looking finely.

INDIANA.—*Tippecanoe*: A far larger area sown this fall than in any previous season, and looking remarkably well. *Dearborn*: Generally late sown; the early sown badly affected by Hessian fly. *Marion*: Winter wheat has made a good growth. *Whitley*: A good fall, and winter wheat doing well.

ILLINOIS.—*Clark*: All early-sown wheat looks well, but much of the crop late and small. *Crawford*: Sown in bad condition on account of dry weather, but fine rains and a late fall have brought it out well. *Jasper*: An increased acreage prevented by fall drought. *Pulaski*: The outlook for winter wheat in this county very good. *Stephenson*: The fall crop looking well. The stand fully equal to that of last year, but not as large a growth for the season. *Saint Clair*: The new wheat crop is as promising as could be desired. *Vermillion*: A very large breadth sown, and has made a splendid growth. Wheat never looked better at this season of the year. *White*: Cause of the unfavorable condition reported; sown very late, and in worse condition than usual on account of extreme drought.

WISCONSIN.—*Dunn*: The present crop doing finely and in good growing condition.

IOWA.—*Jefferson*: A large breadth of winter wheat sown, and in excellent condition.

MISSOURI.—*Lawrence*: Late-sown wheat does not look well this fall, but an increased area has been sown. *Mississippi*: Winter wheat not so rank a growth as at this time last year, but very promising. *Platte*: The growing wheat in poor condition on account of two months' drought. *Sullivan*: A small area sown, and on account of dry weather is not doing well. *Johnson*: Not enough rain since July to bring the fall sowing up. It is supposed that one-third of the seed has not yet germinated. *Lincoln*: Small and backward in consequence of dry weather and late sowing, but healthy and promising. *Vernon*: Acreage

short, and condition poor for want of rain. *Carroll*: Weather has been too dry for winter wheat, but a recent snow will improve it. *Clay*: A continuous drought since midsummer impeded fall seeding, and winter wheat is in a precarious condition. *Daviess*: Looks very badly, owing to dry weather. *Greene*: But a portion of the intended wheat crop sown on account of dry weather. It did not come up well, and looks badly. *Pettis*: Condition of the growing crop poor on account of dry weather. *Pemiscot*: The weather was favorable for seeding, but the area does not exceed that of last year.

KANSAS.—*Clay*: The early sown, on early-plowed land, looks well, but the late crop looks badly. Drilled grain 25 per cent. better than that sown broadcast. *Franklin*: Less sown this year than last on account of dry weather, and now suffering for rain. *Labette*: A smaller acreage sown this year than last on account of drought. Much of the late sown not yet up; condition poor. Early wheat somewhat hurt by Hessian fly. *Leavenworth*: A universal early sowing, and in good condition notwithstanding the drought. *Lincoln*: Ten acres sown this fall to one last fall, and looking badly on account of dry weather. *Nemaha*: Condition of present crop below an average on account of drought. *Sedgwick*: Looking badly, and a small acreage sown. One of the driest seasons for ten years, and wheat generally sown late. *Montgomery*: The small acreage and poor condition are owing in part to drought. *Sumner*: Most of the winter wheat destroyed by grasshoppers. Many of the fields as bare as if they had never been sown.

NEBRASKA.—*Boone*: Winter wheat prospects injured by extremely dry weather. *Platte*: Since sowing, drought has operated against the germination and growth of winter grain.

CALIFORNIA.—*San Joaquin*: The grain sown has not had sufficient rain to germinate it. *Shasta*: Owing to dry fall months but little wheat or grain of any kind yet sown; that sown looks well. More summer fallowing done now than in former years, and meeting with good success. *Yuba*: Too dry, and wheat not doing well.

OREGON.—*Lane*: A considerable now being put in, while some is up and looking well.

Table showing the estimated numbers of farm-stock, expressed as a percentage of the numbers of the previous year, and also an average of actual prices in January, 1879.

States.	Horses.				Mules.				Milch cows.			
	Total number of horses compared with Jan-ary, 1878.	Average price per head un-der 1 year old.	Average price per head be-tween 1 and 3 years old.	Average price per head over 3 years old.	Total number of mules com-pared with Jan-ary, 1878.	Average price per head un-der 1 year old.	Average price per head be-tween 1 and 3 years old.	Average price per head over 3 years old.	Total number of milch cows compared with Jan-uary, 1878.	Percentage.	Average price per head at this time.	
	Percentage.				Percentage.							
Maine	100	\$20 30	\$33 50	\$74 75	75	30 42	47 50	100 75	99	102	\$22 70	25 63
New Hampshire	100	23 14	35 43	72 14	14	24 91	37 19	73 40	99	103	28 28	17 69
Vermont	102	16 43	34 30	72 30	14	24 34	37 07	55 14	101	103	25 00	12 22
Massachusetts	99	20 00	44 00	70 30	103	34 05	53 76	63 95	101	103	34 30	13 41
Rhode Island	100	20 00	40 00	75 00	101	34 79	53 76	63 95	100	106	33 00	13 94
Connecticut	104	25 00	41 00	73 33	101	31 00	40 00	61 00	105	104	33 00	12 02
New York	101	27 93	45 03	69 70	98	33 50	53 50	80 85	103	104	23 57	13 70
New Jersey	100	34 17	50 10	77 54	99	30 00	40 25	64 00	102	104	35 40	13 47
Pennsylvania	100	26 79	41 35	85 80	97	27 59	45 29	97 50	99	102	29 20	16 80
Delaware	100	25 09	40 82	83 73	101	30 42	47 50	100 75	99	102	25 63	17 69
Maryland	102	20 04	31 17	65 92	98	24 91	37 19	73 40	99	103	28 28	12 22
Virginia	102	22 43	35 59	68 45	100	24 34	37 07	55 14	101	103	25 00	13 41
North Carolina	103	28 00	45 45	70 71	103	34 05	53 76	63 95	101	103	34 30	13 94
South Carolina	101	22 13	35 39	74 80	101	34 79	53 76	63 95	100	106	33 00	12 02
Georgia	101	25 71	38 57	82 00	101	31 00	40 00	61 00	105	104	23 57	13 70
Florida	104	20 88	32 92	67 59	100	23 90	37 43	54 84	101	105	13 70	13 47
Alabama	102	19 44	28 05	66 35	102	23 90	31 50	40 00	101	105	13 47	13 47
Mississippi	101	14 36	20 00	50 66	102	21 40	31 50	46 20	101	106	14 53	10 83
Louisiana	102	9 01	13 80	29 67	103	13 34	24 09	36 68	99	104	15 84	10 53
Texas	102	9 01	13 80	29 67	103	13 34	24 09	36 68	99	104	15 84	10 53
Arkansas	103	16 50	24 04	59 73	104	21 27	31 50	46 20	99	103	14 53	10 83
Tennessee	99	19 00	31 92	58 86	98	24 50	37 00	50 84	103	103	15 82	15 82
West Virginia	104	19 94	31 92	62 71	100	24 50	37 00	50 84	102	103	23 48	21 94
Kentucky	102	19 81	29 91	62 71	99	22 55	35 17	64 25	103	103	23 48	21 94
Ohio	101	24 47	37 82	75 98	99	22 55	35 17	64 25	102	102	27 88	21 94
Illinois	106	25 12	42 70	91 93	99	26 11	39 35	67 19	101	101	27 88	21 94
Michigan	100	20 15	32 12	63 03	101	27 07	40 08	68 92	101	101	27 88	21 94
Indiana	100	20 15	32 12	63 03	97	27 07	40 08	68 92	101	101	27 88	21 94
Wisconsin	100	20 05	30 35	63 03	101	27 07	40 08	68 92	101	101	27 88	21 94
Minnesota	106	25 12	42 70	91 93	104	28 57	45 84	94 70	102	106	23 66	23 66
Iowa	115	25 91	40 59	86 27	104	28 57	45 84	94 70	102	106	23 66	23 66
Missouri	103	22 01	33 40	77 67	114	28 57	45 84	94 70	106	106	23 66	23 66
Kansas	105	22 01	33 40	77 67	114	28 57	45 84	94 70	106	106	23 66	23 66
Nebraska	103	16 06	23 65	55 00	101	27 42	39 47	57 13	112	112	19 10	19 10
Nevada	103	16 06	23 65	55 00	101	27 42	39 47	57 13	107	107	19 10	19 10
Idaho	103	16 06	23 65	55 00	101	27 42	39 47	57 13	107	107	19 10	19 10
Montana	103	16 06	23 65	55 00	101	27 42	39 47	57 13	107	107	19 10	19 10
Wyoming	103	16 06	23 65	55 00	101	27 42	39 47	57 13	107	107	19 10	19 10
Utah	103	16 06	23 65	55 00	101	27 42	39 47	57 13	107	107	19 10	19 10
Arizona	103	16 06	23 65	55 00	101	27 42	39 47	57 13	107	107	19 10	19 10
Colorado	103	16 06	23 65	55 00	101	27 42	39 47	57 13	107	107	19 10	19 10
New Mexico	103	16 06	23 65	55 00	101	27 42	39 47	57 13	107	107	19 10	19 10
Oregon	103	16 06	23 65	55 00	101	27 42	39 47	57 13	107	107	19 10	19 10

Table showing the estimated numbers and prices of farm-stock in January, 1879—Continued.

States.	Oxen and other cattle.						Sheep.			Hogs.		
	Total number of oxen and other cattle with that of January, 1878.	Average price per head under 1 year old.	Average price per head between 1 and 3 years old.	Average price per head between 3 and 5 years old.	Average price per head over 5 years old.	Total number of sheep compared with that of January, 1878.	Average price per head under 1 year old.	Average price per head under 1 year old.	Percentage.	Total number of hogs compared with that of January, 1878.	Average price per head under 1 year old.	Average price per head over 1 year old.
Maine.....	Percentage. 103	\$6 70	\$11 50	\$8 50	\$4 60	Percentage. 106	\$2 15	\$2 86	97	Percentage. 97	\$4 00	\$10 50
New Hampshire.....	103	7 50	14 30	10 50	43 28	99	2 37	3 27	100	100	6 53	14 93
Vermont.....	103	7 85	14 30	10 50	43 28	99	2 37	3 27	100	100	6 53	14 93
New York.....	103	7 85	14 30	10 50	43 28	99	2 37	3 27	100	100	6 53	14 93
Massachusetts.....	103	7 85	14 30	10 50	43 28	99	2 37	3 27	100	100	6 53	14 93
Rhode Island.....	103	7 85	14 30	10 50	43 28	99	2 37	3 27	100	100	6 53	14 93
Connecticut.....	103	7 85	14 30	10 50	43 28	99	2 37	3 27	100	100	6 53	14 93
New Jersey.....	103	7 85	14 30	10 50	43 28	99	2 37	3 27	100	100	6 53	14 93
Pennsylvania.....	103	7 85	14 30	10 50	43 28	99	2 37	3 27	100	100	6 53	14 93
Delaware.....	103	7 85	14 30	10 50	43 28	99	2 37	3 27	100	100	6 53	14 93
Maryland.....	103	7 85	14 30	10 50	43 28	99	2 37	3 27	100	100	6 53	14 93
Virginia.....	103	7 85	14 30	10 50	43 28	99	2 37	3 27	100	100	6 53	14 93
North Carolina.....	103	7 85	14 30	10 50	43 28	99	2 37	3 27	100	100	6 53	14 93
South Carolina.....	103	7 85	14 30	10 50	43 28	99	2 37	3 27	100	100	6 53	14 93
Georgia.....	103	7 85	14 30	10 50	43 28	99	2 37	3 27	100	100	6 53	14 93
Florida.....	103	7 85	14 30	10 50	43 28	99	2 37	3 27	100	100	6 53	14 93
Alabama.....	103	7 85	14 30	10 50	43 28	99	2 37	3 27	100	100	6 53	14 93
Mississippi.....	103	7 85	14 30	10 50	43 28	99	2 37	3 27	100	100	6 53	14 93
Louisiana.....	103	7 85	14 30	10 50	43 28	99	2 37	3 27	100	100	6 53	14 93
Texas.....	103	7 85	14 30	10 50	43 28	99	2 37	3 27	100	100	6 53	14 93
Arkansas.....	103	7 85	14 30	10 50	43 28	99	2 37	3 27	100	100	6 53	14 93
Missouri.....	103	7 85	14 30	10 50	43 28	99	2 37	3 27	100	100	6 53	14 93
Illinois.....	103	7 85	14 30	10 50	43 28	99	2 37	3 27	100	100	6 53	14 93
Indiana.....	103	7 85	14 30	10 50	43 28	99	2 37	3 27	100	100	6 53	14 93
Ohio.....	103	7 85	14 30	10 50	43 28	99	2 37	3 27	100	100	6 53	14 93
Michigan.....	103	7 85	14 30	10 50	43 28	99	2 37	3 27	100	100	6 53	14 93
Wisconsin.....	103	7 85	14 30	10 50	43 28	99	2 37	3 27	100	100	6 53	14 93
Minnesota.....	103	7 85	14 30	10 50	43 28	99	2 37	3 27	100	100	6 53	14 93
Nebraska.....	103	7 85	14 30	10 50	43 28	99	2 37	3 27	100	100	6 53	14 93
Kansas.....	103	7 85	14 30	10 50	43 28	99	2 37	3 27	100	100	6 53	14 93
California.....	103	7 85	14 30	10 50	43 28	99	2 37	3 27	100	100	6 53	14 93
Oregon.....	103	7 85	14 30	10 50	43 28	99	2 37	3 27	100	100	6 53	14 93

ON:
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DEPARTMENT OF AGRICULTURE.

SPECIAL REPORT—No. 11.

THE

SILKWORM;

BEING A BRIEF

MANUAL OF INSTRUCTIONS

FOR THE

PRODUCTION OF SILK.

WITH ILLUSTRATIONS.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.

1879.

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SIR: In obedience to your directions, the following brief manual of information relating to the Mulberry Silkworm and to silk culture has been prepared.

Respectfully,

CHAS. V. RILEY,
Entomologist.

Hon. W. G. LE DUC,
Commissioner of Agriculture.

INTRODUCTION.

Whatever opinions may be held as to the feasibility, or as to the profits of silk-culture in this country, the desire for information on the subject and the ambition to embark in the industry, evinced by correspondents of the Department, demonstrate the fact that there will be no difficulty in getting our people to turn their attention to it. Without going into details as to the history of past attempts at silk-culture in North America, it must be obvious to all who thoroughly investigate them that the causes of failure have ever been transient ones. They may be summed up in the statements that (1) labor has found more profitable avenues of employment, and (2) that there has been no home market for the cocoons. At the present time the first statement no longer has force, but the second holds as true now as it ever did.

As a means of meeting the difficulty, I have urged, and would urge, that Congress give to this Department the means to purchase, erect, and appoint with skilled hands, on the Department grounds, a small filature or reeling establishment. In such an establishment reelers could be trained, and the cocoons, at first raised from eggs distributed by the Department, could be skillfully reeled and disposed of to our manufacturers. A market would thus be formed for the cocoons raised in different parts of the country, and a guarantee be given to those who choose to embark in silk-culture that their time would not be thrown away. All industries should be encouraged in their infancy; and for the first few years, or until the silk industry could be considered well established, the cocoons should be paid for at the European market rate, plus the cost of reeling, which would range from 50 cents to 75 cents per pound of choked cocoons. This last should be looked upon as a premium offered by the government to the raisers, in order to stimulate the industry until such time as the reeling might be safely left to private enterprise, when government encouragement could be withdrawn.

Meanwhile, and pending Congressional aid, those who desire to raise silk-worms in this country, for profit, have three alternatives: either (1) to ship the choked cocoons to Europe, (2) to reel them, or (3) to raise eggs and sell these.

(1) That the children and more feeble persons in a household may find profitable employment in raising cocoons to be shipped abroad is proved by the case of Mr. E. Fasnach, of Raleigh, N. C., who has for several years been in the habit of thus shipping the cocoons reared by his family. He sends in bales 6 by 5 feet in size, and averaging about 40 pounds of stifled cocoons, for which he has obtained as high as \$2.50 per pound net, the freight costing only \$3 per hundred pounds between Raleigh and Marseilles. Mr. B. A. Weber, of Rockford, Ill., last year raised 40 pounds of cocoons, and also shipped

to Europe through New York brokers, and others have done likewise; but I would advise no one to invest capital on this basis.

(2) Nor would it be safe for individuals to rely on reeling their own silk. The art of reeling in modern filatures and with steam appliances has been brought to such perfection that the hand-reeler cannot hope to produce a first-class article. The only way in which silk-reeling can be managed profitably, at present, is where a colony of silk-raisers combine to put up and operate a common filature, as in the case of the settlement at Silkville, Kans., the colony of French and Italians who located at Fayetteville, N. C., in 1876, or the Italian settlement at Vineland, N. J.

(3) Under existing circumstances, more money has been made by the sale of eggs than by either of the other means, and silkworm growers in this country have gradually drifted into this branch of the industry. Eggs raised in this country are free from disease, and the fact that as high as \$6 and \$8 per ounce have been paid for them, and that France paid in 1876 114,000 francs and in 1877 1,691,400 francs for eggs exported from the United States,* is as eloquent in showing the remarkable adaptation of our country to silk culture as that other fact, not generally known, that the chief of the French commission to our Centennial confessed that there was no silk in France superior to some that was there on exhibition and grown in North Carolina. The production of a certain number of eggs does not necessarily prevent the production at the same time of choked cocoons or reeled silk; and the pierced cocoons that have been used for breeding purposes have also a certain market value, commanding about \$1 per pound at Paterson, N. J. This egg-producing branch of the industry can, however, only admit of a limited expansion.

As a means of indicating the profits in silk culture I have prepared the subsidiary estimates. Optimistic theorists have done much harm in the past by making fabulous calculations as to the profits of silk culture. The figures here given are based on data furnished by men like Messrs. E. V. Boissière and L. S. Crozier, of Silkville, Kans., E. Fasnach, of Raleigh, N. C., T. N. Dale, of Paterson, N. J., &c., and on the current prices as quoted in the *Moniteur des Soies*. They are in every sense moderate estimates, but it must not be forgotten that they do not include capital invested in the shape of food plants. As yet, and until Congress gives the necessary encouragement, it were safest for those only to embark in this culture who already have mulberry trees to use or who decide to feed Osage orange.

PROFITS OF PRODUCING COCOONS: ESTIMATES FOR TWO ADULTS, OR MAN AND WIFE.

Average number of eggs per ounce, 40,000.

Average number of fresh cocoons per pound, 300.

Average reduction in weight for choked cocoons, 66 per cent.

Maximum amount of fresh cocoons from one ounce of eggs, 130 to 140 pounds.

Allowing for deaths in rearing—26 per cent. being a large estimate—we thus get, as the product of an ounce of eggs, 100 pounds of fresh or 33 pounds of choked cocoons.

Two adults can take charge of the issue of from 3 to 5, say 4 ounces of eggs, which will produce 400 pounds of fresh or 133 pounds of choked cocoons.

* These figures are on the authority of the *Moniteur des Soies* for January 18, 1879, but they may include also those received from China through the United States.

Price per pound of fresh cocoons (1878), 50 cents.

Four hundred pounds of fresh cocoons, at 50 cents, \$200.

Price per pound of fresh cocoons (1876), 70 cents.

Four hundred pounds of fresh cocoons, at 70 cents, \$280.

Actual sales in Marseilles, December, 1878, of choked cocoons, 15 francs per kilogram, or \$1.66 per pound, which for 133 pounds choked cocoons would be \$220.78.

Price per pound of choked cocoons (1876), \$2.25; 133 pounds of choked cocoons at \$2.25, \$299.25.

Freight, packing, commissions, and other incidental expenses, say \$25, making as the return for the labor of two persons for six weeks, at the present low prices, \$195.78.

Calculating on the basis of \$1.50 per pound of choked cocoons, which, as shown in the following estimates, a reeling establishment in this country could afford to pay, we get approximately the same amount, viz, \$199.50. As already stated, the capital invested in food for the worms is not included in these estimates, nor is the first cost of the ounce of eggs deducted. The silk grower should raise his own "seed," and the time required for this purpose is more than compensated for by the time saved in feeding during the first and second ages of the worms, when the whole time of two adults is not required as it is subsequently.

APPROXIMATE PROFITS OF REELING.

One pound of reeled silk requires $3\frac{3}{4}$ pounds of choked cocoons.

An expert can in six days reel $4\frac{1}{2}$ pounds of raw silk.

Price of best raw silk in French market, 1878 (market very low), \$8.50 per pound.

Nine pounds of raw silk, at \$8.50, \$76.50.

The discount for cash, commissions for selling, and transportation would reduce this to \$65.42.

To produce 9 pounds of raw silk would require the labor of two reelers for six days, at \$1 per day, or \$12; adding to this \$2.50 for indirect labor, we get \$14.50 as the cost of labor in reeling 9 pounds.

Thus the labor to reel 1 pound of raw silk will cost \$1.70, or that to reel 1 pound of choked cocoons, approximately, 50 cents.

Deducting the cost of reeling from the \$65.42 obtained, we have \$50.92 with which to buy the necessary cocoons; say 33 pounds of choked cocoons for the 9 pounds reeled silk. If we use \$49.50 of this sum for this purpose it will enable us to pay \$1.50 per pound for our cocoons and we still have \$1.42 as a profit on every 9 pounds of raw silk manufactured. This, if we employed two hundred reelers, would be a yearly income of \$7,384.

It is safe to say that the process of reeling just about doubles the value of the product, and if the silk-raiser can reel his own cocoons he may safely count on this increase of its value, provided it is *well* reeled.

What the actual profits are that accrue to the owners of the large filatures in Tarascon, and other parts of South France or Italy, it would be impossible to state without having access to the books of the companies.

ESTIMATE OF PROFITS IN RAISING EGGS.

Average number of eggs in an ounce, 40,000.

Maximum number of cocoons from one ounce of eggs, 40,000.

One-half of these, or 20,000, are females.

Number of eggs laid by each female, say, 300.

Quantity of eggs from one ounce, 6,000,000, or 150 ounces.

Deducting, as probable loss from all causes combined, one-half, we have 75 ounces.

Price of eggs in Europe, \$2 to \$5, say \$3 per ounce.

Amount realized on 1 ounce, \$225.

On the basis of the first estimates two adults could take charge of the issue from 4 ounces of eggs. These would yield the sum of \$900, and, even after allowing for the first cost of eggs, trays, commission, freight (which is light), extra time and labor (say another month), and incidental expenses, it leaves a very excellent return.

In studying the above estimates the reader must bear in mind that the silk industry, like all industries, will have its ups and downs—its periods of buoyancy and depression. It is just now going through one of these last. Silk-culture never was and never will be an exceedingly profitable business, but it adds vast wealth to the nations engaged in it, for the simple reason that it can be pursued by the humblest and poorest, and requires so little outlay. The question of its establishment in the United States is, as I have elsewhere said, “a question of adding to our own productive resources. There are hundreds of thousands of families in the United States to-day who would be most willing to add a few dollars to their annual income by giving light and easy employment for a few months each year to the more aged, to the young, and especially to the women of the family, who may have no other means of profitably employing their time.

“This holds especially true of the people of the Southern States, most of which are pre-eminently adapted to silk culture. The girls of the farm, who devote a little time each year to the raising of cocoons, may not earn as much as their brothers in the field, but they may earn something, and that something represents an increase of income, because it provides labor to those members of society who at present too often have none that is remunerative. Further, the raising of a few pounds of cocoons each year does not and need not materially interfere with the household and other duties that now engage their time, and it is by each household raising a few pounds of cocoons that silk culture must, in the end, be carried on in this as it has always been in other countries. Large rearing establishments seldom pay.”

In what follows there has been no attempt to give a detailed treatise on the silk industry. It has been the endeavor rather to convey the more important information required for beginners. The few quotations are from the writer's fourth report on the insects of Missouri (1871), and it is hoped that, by the aid of a closing glossary of the few unavoidable technical terms that are used, the language will be clear to all.

THE SILKWORM.

A BRIEF MANUAL OF INSTRUCTIONS FOR THE PRODUCTION OF SILK.

NATURE OF THE SILKWORM.

The Silkworm proper, or that which supplies the ordinary silk of commerce, is the larva of a small moth known to scientific men as *Serica mori*. It is often popularly characterized as the Mulberry Silkworm. Its place among insects is with the *Lepidoptera*, or Scaly-winged insects, family *Bombycidae*, or Spinners. There are several closely allied species, which spin silk of different qualities, none of which, however, unite strength and fineness in the same admirable proportions as does that of the mulberry species. The latter has, moreover, acquired many useful peculiarities during the long centuries of cultivation it has undergone. It has in fact become a true domesticated animal. The quality which man has endeavored to select in breeding this insect is, of course, that of silk producing, and hence we find that, when we compare it with its wild relations, the cocoon is vastly disproportionate to the size of the worm which makes it or the moth that issues from it. Other peculiarities have incidentally appeared, and the great number of varieties or races of the Silkworm almost equals those of the domestic Dog. The white color of the species; its seeming want of all desire to escape as long as it is kept supplied with leaves, and the loss of the power of flight on the part of the moth, are all undoubtedly the result of domestication. From these facts, and particularly from that of the great variation within specific limits to which the insect is subject, it will be evident to all that the following remarks upon the nature of the Silkworm must necessarily be very general in their character.

The Silkworm exists in four states—egg, larva, chrysalis, and adult or imago—which we will briefly describe.

DIFFERENT STATES OR STAGES OF THE SILKWORM.

THE EGG.—The egg of the Silkworm moth is called by silk-raisers the “seed.” It is nearly round, slightly flattened, and in size resembles a turnip-seed. Its color when first deposited is yellow, and this color it retains if unimpregnated. If impregnated, however, it soon acquires a gray, slate, lilac, violet, or even dark green hue, according to variety or breed. It also becomes indented. When diseased it assumes a still darker and dull tint. With some varieties it is fastened to the substance upon which it is deposited, by a gummy secretion of the moth produced in the act of ovipositing. Other varieties, however, among which may be mentioned the Adrianople whites and the yellows from Nouka, in the Caucasus, have not this natural gum. As the hatching point approaches, the egg becomes lighter in color, which is due to the fact that its

fluid contents become concentrated, as it were, into the central, forming worm, leaving an intervening space between it and the shell, which is semi-transparent. Just before hatching, the worm within becoming more active, a slight clicking sound is frequently heard, which sound is, however, common to the eggs of many other insects. After the worm has made its exit by gnawing a hole through one side of the shell, this last becomes quite white. Each female produces on an average from three to four hundred eggs, and one ounce of eggs contains about 40,000 individuals. It has been noticed that the color of the albuminous fluid of the egg corresponds to that of the cocoon, so that when the fluid is white the cocoon produced is also white, and when yellow the cocoon again corresponds.

THE LARVA OR WORM.—The worm goes through from three to four molts

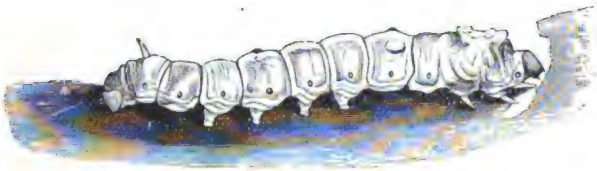


FIG. 1.—Full-grown larva or worm (after Riley).

or sicknesses, the latter being the normal number. The periods between these different molts are called "ages," there being five of these ages in-

cluding the first from the hatching and the last from the fourth molt to the spinning period. The time between each of these molts is usually divided as follows: The first period occupies from five to six days, the second but four or five, the third about five, the fourth from five to six, and the fifth from eight to ten. These periods are not exact, but simply proportionate. The time from the hatching to the spinning of the cocoons may, and does, vary all the way from thirty to forty days, depending upon the race of the worm, the quality of the food, mode of feeding, temperature, &c.; but the same relative proportion of time between molts usually holds true.

The color of the newly hatched worm is black or dark gray, and it is covered with long stiff hairs, which, upon close examination, will be found to spring from pale-colored tubercles. Different shades of dark gray will, however, be found among worms hatching from the same batch of eggs. The hairs and tubercles are not noticeable after the first molt and the worm gradually gets lighter and lighter until, in the last age, it is of a cream-white color. When full grown it presents the appearance of Fig. 1. It never becomes entirely smooth, however, as there are short hairs along the sides, and very minute ones, not noticeable with the unaided eye, all over the body.

The preparation for each molt requires from two to three days of fasting and rest, during which time the worm attaches itself firmly by the abdominal prolegs (the 8 non-articulated legs under the 6th, 7th, 8th, and 9th segments of the body, called prolegs in contradistinction to the 6 articulated true legs under the 1st, 2d, and 3d segments), and holds up the fore part of the body, and sometimes the tail. In front of the first joint a dark triangular spot is at this time noticeable, indicating the growth of the new head; and when the term of "sickness" is over, the worm casts its old integument, rests a short time to recover strength, and then, freshened, supple, and hungry, goes to work feeding

voraciously to compensate for lost time. This so-called "sickness" which preceded the molt was, in its turn, preceded by a most voracious appetite which served to stretch the skin. In the operation of molting the new head is first disengaged from the old skin, which is then gradually worked back from segment to segment until entirely cast off. If the worm is feeble, or has met with any misfortune, the shriveled skin may remain on the end of the body, being held by the anal horn; in which case the individual usually perishes in the course of time. It has been usually estimated that the worm in its growth consumes its own weight of leaves every day it feeds; but this is only an approximation. Yet it is certain that during the last few days before commencing to spin, it consumes more than during the whole of its previous worm-existence. It is a curious fact, first noted by Quatrefages, that the color of the abdominal prolegs at this time corresponds with the color of the silk.

Having attained full growth, the worm is ready to spin up. It shrinks somewhat in size, voids most of the excrement remaining in the alimentary canal; acquires a clear, translucent, often pinkish or amber-colored hue; becomes restless; ceases to feed, and throws out silken threads. The silk is elaborated in a fluid condition in two long, slender, convoluted vessels, one upon each side of the alimentary canal. As these vessels approach the head they become less convoluted and more slender, and finally unite within the spinneret, from which the silk issues in a glutinous state and apparently in a single thread. The glutinous liquid which combines the two, and which hardens immediately on exposure to the air, may, however, be dissolved in warm water. The worm usually consumes from three to five days in the construction of the cocoon and then passes in three days more, by a final molt, into the chrysalis state.

THE COCOON.—The cocoon (Fig. 2) consists of an outer lining of loose silk known as "floss," which is used for carding, and is spun by the worm in first getting its bearings. The amount of this loose silk varies in different breeds. The inner cocoon is tough, strong, and compact, composed of a firm, continuous thread, which is, however, not wound in concentric circles as might be supposed, but irregularly, in short figure of 8 loops, first in one place and then in another, so that in reeling, several yards of silk may be taken off without the cocoon turning round. In form the cocoon is usually oval, and in color yellowish, but in both these features it varies greatly, being either pure silvery-white, cream or carneau, green, and even roseate, and very often constricted in the middle. It has always been considered possible to distinguish the sex of the contained insect from the general shape of the cocoon, those containing males being slender, depressed in the middle, and pointed at both ends, while the female cocoons are of a larger size and rounder form, and resemble in shape a hen's egg with equal ends. Mr. Crozier, however, emphatically denies this and thinks it "next to impossible for the smartest connoisseur not to be mistaken."

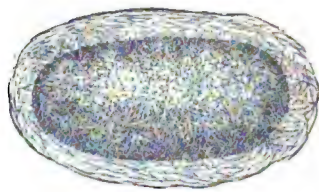


Fig. 2.—Silkworm cocoon.

THE CHRYSALIS.—The chrysalis is a brown, oval body, considerably less in size than the full-grown worm. In the external integument may be traced folds

corresponding with the abdominal rings, the wings folded over the breast, the antennæ, and the eyes of the inclosed insect—the future moth. At the posterior end of the chrysalis, pushed closely up to the wall of the cocoon, is the last larval skin, compressed into a dry wad of wrinkled integument. The chrysalis state continues for from two to three weeks, when the skin bursts and the moth emerges.

THE MOTH.—With no jaws, and confined within the narrow space of the cocoon, the moth finds some difficulty in escaping. For this purpose it is pro-



FIG. 3.—Silkworm moth, male (after Riley).

vided, in two glands near the obsolete mouth, with a strongly alkaline liquid secretion with which it moistens the end of the cocoon and dissolves the hard gummy lining. Then, by a forward and backward motion, the prisoner, with crimped and damp wings, gradually forces its way out, and when once out the wings soon expand and dry. The silken threads are simply pushed aside, but enough of them get broken in the process to render

the cocoons, from which the moths escape, comparatively useless for reeling. The moth is of a cream color, with more or less distinct brownish markings across the wings, as in Fig. 3. The males have broader antennæ or feelers than the females, and may, by this feature, at once be distinguished. Neither sex flies, but the male is more active than the female. They couple soon after issuing, and in a short time the female begins depositing her eggs, whether they have been impregnated or not. Very rarely the unimpregnated egg has been observed to develop.

ENEMIES AND DISEASES.

As regards the enemies of the Silkworm but little need be said. It has been generally supposed that no true parasite will attack it, but in China and Japan great numbers of the worms are killed by a disease known as “uji,” which is undoubtedly produced by the larva of some insect parasite. Several diseases of a fungoid or epizootic nature, and several maladies which have not been sufficiently characterized to enable us to determine their nature, are common to this worm. One of these diseases, called *muscardine*, has been more or less destructive in Europe for many years. It is of precisely the same nature as the fungus (*Empusa musce*), which so frequently kills the common House-fly, and which sheds a halo of spores, readily seen upon the window-pane, around its victim.

A worm, about to die of this disease, becomes languid, and the pulsations of the dorsal vessel or heart become insensible. It suddenly dies, and in a few hours becomes stiff, rigid, and discolored; and finally, in about a day, a white powder or efflorescence manifests itself, and soon entirely covers the body, developing most rapidly in a warm, humid atmosphere. No outward signs indicate the first stage of the disease, and though it attacks worms of all ages, it is by far the most fatal in the fifth or last age or stage, just before the transformation.

"This disease was proved by Bassi to be due to the development of a fungus (*Botrytis Bassiana*) in the body of the worm. It is certainly infectious, the spores, when they come in contact with the body of the worm, germinating and sending forth filaments which penetrate the skin, and upon reaching the internal parts, give off minute floating corpuscles which eventually spore in the efflorescent manner described. Yet most silkworm raisers, including such good authorities as E. F. Guérin-Méneville and Eugene Robert,* who at first implicitly believed in the fungus origin of this disease, now consider that the *Botrytis* is only the ultimate symptom—the termination of it. At the same time they freely admit that the disease may be contracted by the *Botrytis* spores coming in contact with worms predisposed by unfavorable conditions to their influence. Such a view implies the contradictory belief that the disease may or may not be the result of the fungus; and those who consider the fungus as the sole cause certainly have the advantage of consistency." Dr. Carpenter, of microscopic fame, believes in the fungus origin of the disease, and thinks it entirely caused by floating spores being carried in at the spiracles or breathing orifices of the worm, and germinating in the interior of the body.

Whichever view be held, it appears very clear that no remedies are known, but that care in procuring good eggs, care in rearing the worms, good leaves, pure, even-temperated atmosphere, and cleanliness are checks to the disease. The drawers, and other objects with which the diseased worms may have been in contact, should be purified by fumigations of sulphurous acid ($S O_2$), produced by mixing bisulphite of soda with any strong acid, or, better still, by subjecting them to a carbolic-acid spray from an atomizer. In this way all fungus spores will be destroyed. In fact it will be well to wash off the trays or shelves once in a while with diluted carbolic acid, as a sure preventive. It is the best disinfectant known to science. The cheapest kinds may be used with the same efficacy as the more expensive.

Another disease, known as *pébrine*, has proved extremely fatal in Southern Europe, and for twenty years has almost paralyzed silk culture in France. It is a disease which, in its nature and action, except in being hereditary, bears a striking analogy to cholera among men. "The worms affected by *pébrine* grow unequally, become languid, lose appetite, and often manifest discolored spots upon the skin. They die at all ages, but, as in *muscardine*, the mortality is greatest in the last age. The real nature of this malady was for a long time unknown. In 1849 M. Guérin-Méneville first noticed floating corpuscles in the bodies of the diseased worms. These corpuscles were supposed by him to be endowed with independent life, but their motion was afterwards shown by Filippi to depend on what is known as the Brownian motion, and they are now known either by the name of *panhistophyton*, first given them by Lebret, or by that of *psorospermie*. They fill the silk canals, invade the intestines, and spread throughout the tissues of the animal in all its different states; and though it was for a long time a mooted question as to whether they were the true cause or the mere result of the disease, the praiseworthy researches

*Guide à l'éleveur de vers à soie.

of Pasteur have demonstrated that *pébrine* is entirely dependent upon the presence and multiplication of these corpuscles. He has analyzed the disease so clearly that not only do we see its nature, but are able to point out the remedy. The disease is both contagious and infectious, because the corpuscles which have been passed with the excrement or with other secretions of diseased worms have been taken into the alimentary canal of healthy ones in devouring the soiled leaves, and because it may be inoculated by wounds inflicted by the claws. It is hereditary on the mother's side, because the moth may have the germ of the disease and yet oviposit. Indeed, the eggs may be affected and yet look fair and good, the microscopic *psorospermia* not being visible, so that the only true test of disease or health is an examination of the parent moth; and by killing off all infected moths the disease can be controlled.

"Both the diseases mentioned are, therefore, in the strict sense of the word, Silkworm plagues; the one of a fungus and the other of an epizootic nature. Each may become epidemic when the conditions are favorable for the undue multiplication of the minute organisms which produce them, or when the checks to the increase of such organisms are removed by carelessness or ignorance." Cleanliness and purification are absolutely necessary in treating both these diseases, and in *pébrine* care must be taken that the eggs are sound by a microscopic examination of the moths. This may be done after the eggs are laid, and if the corpuscles be found in the mother, her eggs should be discarded.

Silkworms are subject to other diseases, but none of them have ever acquired the importance of those described. What is called *gattine* by older authors is but a mild phase of *pébrine*. The worms are apt to be purged by unwholesome leaves; too great heat makes them sickly; or they may become yellow, limp, and die of a malady called *grasserie* or jaundice, which is almost sure to appear in large broods, and which is very common in those reared in this country. When the worms die from being unable to molt they are called *lusettes*, and such cases are most abundant at the fourth molt. All these different ailments, and others not mentioned, have received names, some local, others more general; but none of them warrant further notice here, as they are not likely to become very troublesome if proper attention and care be given to the worms.

VARIETIES OR RACES.

As before stated, domestication has had the effect of producing numerous varieties of the Silkworm, every different climate into which it has been carried having produced either some changes in the quality of the silk, or the shape or color of the cocoons; or else altered the habits of the worm.

Some varieties produce but one brood in a year, no matter how the eggs are manipulated: such are known as *Annuals*. Others, known as *Bivoltins*, hatch twice in the course of the year; the first time, as with the Annuals, in April or May, and the second, eight or ten days after the eggs are laid by the first brood. The eggs of the second brood only are kept for the next year's crop, as those of the first brood always either hatch or die soon after being laid. The *Trevoltins* produce three annual generations. There are also *Quadrivoltins*, and, in Bengal, a variety known as *Dacey* which is said to produce eight genera-

tions in the course of a year. Some varieties molt but three times instead of four, especially in warm countries and with Trevoltins. Experiments, taking into consideration the size of the cocoon, quality of silk, time occupied, hardness, quantity of leaves required, etc., have proved the Annuals to be more profitable than any of the polyvoltins, although Bivoltins are often reared; and Mr. Alfred Brewster, of San Gabriel, Cal., says that he found a green Japanese variety of these last more hardy than the Chinese Annuals. Varieties are also known, by the color of the cocoons they produce, as Greens, or Whites, or Yellows, and also by the country in which they flourish. The white silk is the most valuable in commerce, but the races producing yellow, cream-colored, or flesh-colored cocoons are generally considered to be the most vigorous. No classification of varieties can be attempted, as individuals of the same breed exported to a dozen different localities would, in all probability, soon present a dozen varieties. The three most marked and noted European varieties are

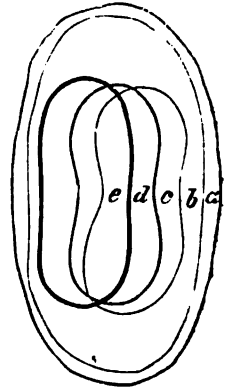


FIG. 4.—Shapes of silkworm cocoons.

the Milanese (Italian) breed, producing fine small yellow cocoons; the Ardèche (French), producing large yellow cocoons, and the Brousse (Turkish), producing large white cocoons of the best quality in Europe. Owing to the fearful prevalence of *pébrine* among the French and Italian races for fifteen or twenty years back, the Japanese Annuals have come into favor. The eggs are bought at Yokohama in September, and shipped during the winter. There are two principal varieties in use, the one producing white and the other greenish cocoons, and known respectively as the White Japanese and the Green Japanese Annuals. These cocoons are by no means large, but the pods are solid and firm, and yield an abundance of silk. They are about of a size, and both varieties are almost always constricted in the middle (Fig. 4, *c* green, *d* white). Another valuable race is the White Chinese Annual (Fig. 4, *e*), which much resembles the White Japanese, but is not as generally constricted. Fig. 4, *a* and *b* represent, respectively, white and yellow French annuals.

WINTERING AND HATCHING THE EGGS.

We have already seen the importance of getting healthy eggs, free from hereditary disease, and of good and valuable races. There is little danger of premature hatching until December, but from that time on, the eggs should be kept in a cool, dry room in tin boxes to prevent the ravages of rats and mice. They are most safely stored in a dry cellar, where the temperature rarely sinks below the freezing point, and they should be occasionally looked at to make sure that they are not affected by mold. If, at any time, mold be perceived upon them it should be at once rubbed or brushed off, and the atmosphere made drier. If the tin boxes be perforated on two sides and the perforations covered with fine wire gauze, the chances of injury will be reduced to a minimum.

The eggs may also, whether on cards or loose,* be tied up in small bags and hung to the ceiling of the cold room. The string of the bag should be passed through a bottle neck or a piece of tin to prevent injury from rats and mice. The temperature should never be allowed to rise above 40° F., but may be allowed to sink below freezing point without injury. Indeed, eggs sent from one country to another are usually packed in ice. They should be kept at a low temperature until the Mulberry leaves are well started in the spring, and great care must be taken as the weather grows warmer to prevent hatching before their food is ready for them, since both the Mulberry and Osage orange are rather late in leafing out. One great object should be, in fact, to have them all kept back, as the tendency in our climate is to premature hatching. Another object should be to have them hatch uniformly, and this is best attained by keeping together those laid at one and the same time, and by wintering them, as already recommended, in cellars that are cool enough to prevent any embryonic development. They should then, as soon as the leaves of their food-plant have commenced to put forth, be placed in trays and brought into a well-aired room where the temperature averages about 75° F. If they have been wintered adhering to the cloth on which they were laid, all that is necessary to do is to spread this same cloth over the bottom of a tray. If, on the contrary, they have been wintered in the loose condition, they must be uniformly sifted or spread over sheets of cloth or paper. The temperature should be kept uniform, and a small stove in the hatching-room will prove very valuable in providing this uniformity. The heat of the room may be increased about 2° each day, and if the eggs have been well kept back during the winter, they will begin to hatch under such treatment on the fifth or sixth day. By no means must the eggs be exposed to the sun's rays, which would kill them in a very short time. As the time of hatching approaches, the eggs grow lighter in color, and then the atmosphere must be kept moist artificially by sprinkling the floor, or otherwise, in order to enable the worms to eat through the egg-shell more easily. They also appear fresher and more vigorous with due amount of moisture.

FEEDING AND REARING THE WORMS.

The room in which the rearing is to be done should be so arranged that it can be thoroughly and easily ventilated, and warmed if desirable. A north-east exposure is the best, and buildings erected for the express purpose should, of course, combine these requisites. If but few worms are to be reared, all the operations can be performed in trays upon tables, but in large establishments the room is arranged with deep and numerous shelves, from 4 to 8 feet deep and 2 feet 6 inches apart. All wood, however, should be well seasoned, as green wood seems to be injurious to the health of the worms. When the eggs are about to hatch, mosquito-netting or perforated paper should be laid over them lightly. Upon this can be evenly spread freshly-plucked leaves or buds. The worms will rise through the meshes of the net or the holes in the paper and cluster upon the leaves, when the whole net can easily be moved. In this

* For explanation, see what follows under egg-laying, p. 24.

moving, paper has the advantage over the netting, in that it is stiffer and does not lump the worms together in the middle. They may now be spread upon the shelves or trays, care being taken to give them plenty of space, as they grow rapidly. Each day's hatching should be kept separate in order that the worms may be of a uniform size, and go through their different moltings or sicknesses with regularity and uniformity; and all eggs not hatched after the fourth day from the appearance of the first should be thrown away, as they will be found to contain inferior, weakly, or sickly worms. It is calculated that one ounce of eggs of a good race will produce 100 pounds of fresh cocoons; while for every additional ounce the percentage is reduced if the worms are all raised together, until for 20 ounces the average does not exceed 25 pounds of cocoons per ounce. Such is the general experience throughout France, according to Guérin Méneville, and it shows the importance of keeping them in small broods, or of rearing on a moderate scale.

The young worms may be removed from place to place by means of a small camel's-hair brush, but should be handled as little as possible. The best mode of feeding and caring for them is by continuing the use of the feeding-net first mentioned. As the worms increase in size the net must have larger meshes, and if it should be used every time fresh food is furnished, it will save a large amount of time and care. It entirely obviates the necessity of handling the worms, and enables the person having charge of them to keep them thoroughly clean; for, while they pass up through the net to take their fresh food, their excrement drops through it and is always taken up with the old litter beneath. It also acts as a detective of disease; for such worms as are injured, feeble, or sickly, usually fail to mount through the meshes and should be carried off and destroyed with the refuse in the old net below. This placing on of the new net and carrying away of the old is such a great convenience and time-saver that, in France, for many years, paper, stamped by machinery with holes of different sizes, suited to the different stages of the worms, has been used. The paper has the advantage of cheapness and stiffness, but a discussion as to the best material is unnecessary here, the aim being to enforce the principle of the progressive rise of the worms. Details will suggest themselves to the operator.

Where the nets are not used, there is an advantage in feeding the worms upon leaf-covered twigs and branches, because these last allow a free passage of air, and the leaves keep fresh a longer time than when plucked. In thus feeding with branches consists the whole secret of the California system, so much praised and advocated by M. L. Prevost. The proper, stamped paper not being easily obtained in this country, mosquito-netting will be found a very fair substitute while the worms are young, and when they are larger I have found thin slats of some non-resinous and well-seasoned wood, tacked in parallel lines to a frame just large enough to set in the trays, very serviceable and convenient—small square blocks of similar wood being used at the corners of the tray to support the frame while the worms are passing up through it. Coarse twine-netting stretched over a similar frame will answer the same purpose, but wire-netting is less useful, as the worms dislike the smooth metal.

Where branches, and not leaves, are fed, the Osage orange has the advantage of Mulberry, as its spines prevent too close settling or packing, and thus insure ventilation. It is recommended by many to feed the worms while in their first age, and, consequently, weak and tender, leaves that have been cut up or hashed, in order to give them more edges to eat upon and to make less work for them. This, however, is hardly necessary with Annuals, although it is quite generally practiced in France. With the second brood of Bivoltins it might be advisable, inasmuch as the leaves at the season of the year when they appear, have attained their full growth and are a little tough for the newly-hatched individuals. In the spring, however, the leaves are small and tender, and nature has provided the young worms with sufficiently strong jaws to cut them.

Many rules have been laid down as to regularity of feeding, and much stress has been put upon it by some writers, most advising four meals a day at regular intervals, while a given number of meals between molts has also been urged; but such definite rules are of but little avail, as so much depends upon circumstances and conditions. The food should, in fact, be renewed whenever the leaves have been devoured, or whenever they have become in the least dry, which, of course, takes place much quicker when young and tender than when mature. This also is an objection to the use of the hashed leaves, as, of course, they would dry very quickly. The worms eat most freely early in the morning and late at night, and it would be well to renew the leaves abundantly between 5 and 6 a. m. and between 10 and 11 p. m. One or two additional meals should be given during the day, according as the worms may seem to need them. Great care should be taken to pick the leaves for the early morning meal the evening before, as when picked and fed with the dew upon them they are more apt to induce disease. Indeed, the rule should be laid down, never feed wet or damp leaves to your worms. In case they are picked during a rain, they should be thoroughly dried before being fed; and on the approach of a storm it is always well to lay in a stock, which should be kept from heating by occasional stirring. Care should also be taken to spread the leaves evenly, so that all may feed alike. During this first and most delicate age the worm requires much care and watching.

As the fifth or sixth day approaches, signs of the first molt begin to be noticed. The worm begins to lose appetite and grow more shiny, and soon the dark spot already described appears above the head. Feeding should now cease, and the shelves or trays should be made as clean as possible. Some will undoubtedly undergo the shedding of the skin much more easily and quickly than others, but no feed should be given to these forward individuals until nearly all have completed the molt. This serves to keep the batch together, and the first ones will wait one or even two days without injury from want of food. It is, however, unnecessary to wait for all, as there will always be some few which remain sick after the great majority have cast their skins. These should either be set aside and kept separate, or destroyed, as they are usually the most feeble and most inclined to disease; otherwise, the batch will grow more and more irregular in their moltings and the diseased worms will

contaminate the healthy ones. It is really doubtful whether the silk raised from these weak individuals will pay for the trouble of rearing them separately, and it will be better perhaps to destroy them. The importance of keeping each batch together, and of causing the worms to molt simultaneously, cannot be too much insisted upon as a means of saving time.

As soon as the great majority have molted they should be copiously fed, and, as they grow very rapidly after each molt, and as they must always be allowed plenty of room, it will probably become necessary to divide the batch, and this is readily done at any meal by removing the net when about half of the worms have risen and replacing it by an additional one. The space allotted to each batch should, of course, be increased proportionately with the growth of the worms. The same precautions should be observed in the three succeeding molts as in this first one.

As regards the temperature of the rearing-room, great care should be taken to avoid all sudden changes from warm to cold, or *vice versa*. A mean temperature of 75° or 80° F. will usually bring the worms to the spinning-point in the course of 35 days after hatching, but the rapidity of development depends upon a variety of other causes, such as quality of leaf, race of worm, &c. If it can be prevented, the temperature should not be permitted to rise very much above 80°, and it is for this reason that a room with a northern or northeastern exposure was recommended as preferable to any other. The air should be kept pure all of the time, and arrangements should be made to secure a good circulation. Great care should be taken to guard against the incursions of ants and other predacious insects, which would make sad havoc among the worms were they allowed an entrance, and all through the existence of the insect, from the egg to the moth, rats and mice are on the watch for a chance to get at them, and are to be feared almost as much as any other enemy the Silkworm has.

The second and third casting of the skin take place with but little more difficulty than the first, but the fourth is more laborious, and the worms not only take more time in undergoing it, but more often perish in the act. At this molt it is perhaps better to give the more forward individuals a light feed as soon as they have completed the change, inasmuch as it is the last molt and but little is to be gained by the retardation, whereas it is important to feed them all that they will eat, since much of the nutriment given during the last age goes for the elaboration of the silk. At each successive molt the color of the worm has been gradually whitening, until it is now of a decided cream color. Some breeds, however, remain dark, and occasionally there is an individual with zebra-like markings. During these last few days the worms require the greatest care and attention. All excrement and litter must be often removed, and the sickly and diseased ones watched for and removed from the rest. The quantity of leaves which they devour in this fifth age is something enormous, and the feeding will keep the attendant busily employed.

Summed up, the requisites to successful Silkworm raising are: 1st. Uniformity of age in the individuals of the same tray, so as to insure their molting simultaneously. 2d. No intermission in the supply of fresh food, except during

the molting periods. 3d. Plenty of room, so that the worms may not too closely crowd each other. 4th. Fresh air and as uniform temperature as possible. 5th. Cleanliness. The last three are particularly necessary during the fourth and fifth ages. While small, the frass, dung, and detritus dry rapidly, and may (though they should not) be left for several days in a tray with impunity, but he who allows his trays to go uncleaned for more than a day during the ages mentioned will suffer in the disease and mortality of his worms just as they are reaching the spinning-point.

PREPARATION FOR SPINNING.

With eight or ten days of busy feeding, after the last molt, the worms, as we have learned before, will begin to lose appetite, shrink in size, become restless, and throw out silk, and the arches for the spinning of the cocoons must now be prepared. These can be made of twigs of different trees, two or three feet long, set up upon the shelves over the worms, and made to interlock in the form of an arch above them. Interlace these twigs with broom-corn, hemlock, or other well-dried brush. The feet of each arch should be only about a foot apart. • The temperature of the room should now be kept above 80°, as the silk does not flow so freely in a cool atmosphere. The worms will immediately mount into the branches and commence to spin their cocoons. They will not all, however, mount at the same time, and those which are more tardy should be fed often, but in small quantities at a time, in order to economize the leaves, as almost every moment some few will quit and mount. There will always be a few which altogether fail to mount, and prefer to spin in their trays. It is best, therefore, after the bulk have mounted, to remove the trays and lay brush carefully over them. The fact that the worms already mounted make a final discharge of soft and semifluid excrement before beginning to spin makes this separation necessary, as otherwise the cocoons of the lower ones would be badly soiled. As the worms begin to spin they should be carefully watched, to guard against two or three of them making what is called a double or trèble cocoon, which would be unfit for reeling purposes. Whenever one worm is about to spin up too near another, it should be carefully removed to another part of the arch. In two or three days the spinning will have been completed, and in six or seven the chrysalis will be formed.

GATHERING THE COCOONS.

Eight days from the time the spinning commenced, it will be time to gather the cocoons. The arches should be carefully taken apart, and the spotted or stained cocoons first removed and laid aside. Care should be taken not to stain the clean ones with the black fluids of such worms as may have died and become putrid, for there are always a few of these in every cocoonery. The outer cocoons of loose or floss silk are then torn from the inner cocoons or pods, and the latter separated according to color, weight, and firmness of texture; those which best resist pressure indicating that the worm has best accomplished its work. Too much care cannot be taken to remove the soft or imperfect cocoons, as, if mixed with the firm ones, they would be crushed

and soil the others with their contents. The very best of the firm cocoons are now to be chosen as seed for the next year, unless the raiser prefers buying his eggs to the trouble of caring for the moths and keeping the eggs through the winter. Eggs bought from large establishments are, however, apt to be untrustworthy, and it is well for all silk-raisers to provide their own seed. These cocoons should be chosen for their firmness, and the fineness and color of the silk, rather than for their size. Mr. Crozier says: "If white, take them of the purest white, neither soft nor satin-like; if yellow, give the preference to the straw-colored, which are the most sought after; and, last, if they are the green of Japan, the greener they are, of a dark, sharp color, very glossy, the better is the quality of the thread. Discard the pale shades in the last breed." If there are any double or treble cocoons in the batch, of the right color, quality, and consistency, they should be used before the others, as they are just as good for breeding purposes, though unfit for reeling. In estimating the quantity that will be required, the following figures will be of use: The general estimate is always made of 40,000 eggs to the ounce, and also that each female lays from 300 to 400 eggs. Taking the higher estimate, it will require only 100 females to lay an ounce of eggs; taking the lower, it will require 133. It will, therefore, not be safe to take fewer than 200 cocoons, half males and half females, if an ounce of seed is desired, and from that to 225 would be safer. While it may not always be possible to determine the sex of the cocoons by their shape, we may approximately separate them by weighing. The whole quantity set aside for breeding purposes is first weighed in order to get the average, and then each one is weighed separately, and all above the average may be pretty accurately considered females and all below it males. These breeding cocoons should now be either pasted upon card-board on their sides, or strung upon a string, great care being taken to run the needle through the silk only and not deep enough to injure the chrysalis, the object being in both cases to secure the cocoon so that the moth can the more readily make its escape. They can be laid aside in a rat-proof place to await the appearance of the moths, and in the mean time the other cocoons should be taken care of.

CHOKING THE CHRYSALIS.

In most silk-producing countries the parties who raise the cocoons sell them to the reeling establishments before suffocation is necessary, as these establishments have better facilities for this work than are to be found in private families. If, however, the reeling is done by the raiser, or some time must elapse before the cocoons can be sent to a reeling establishment, some means must be used to kill the contained chrysalis before the cocoon is injured for reeling purposes by the egress of the moth. This can be done by stifling them with steam or choking them by dry heat. Steaming is the surest, quickest, and best method, if the facilities are at hand: it can be done at any steam mill. The cocoons are laid upon shelves in a tightly-sealed box and the steam is turned in. Twenty minutes will suffice to do the required work, and the cocoons are then dried in the sun. The dry-heat method occupies a much longer time. The cocoons are placed in shallow baskets and slipped on iron drawers into

an oven which is kept heated to a temperature of about 200° F. This should not be increased for fear of burning the silk. This operation lasts from two to twenty-four hours. A certain humming noise continues so long as there is any life, and its cessation is an indication that the chrysalids are all dead. Where the choking is well done there is little loss, only about one per cent. of the cocoons bursting at the ends. After choking in this manner, the cocoons should be strewn upon long wooden shelves in the shade, with plenty of air, and, for the first few days, frequently stirred. After remaining on these shelves for about two months, with occasional stirrings, the chrysalids become quite dry and the cocoons will preserve indefinitely. They are, however, still subject to the attacks of rats and mice, and the little beetles known as "museum pests," belonging to the genera *Dermestes* and *Anthrenus*, are attracted by the dead chrysalis within and will penetrate the cocoon, injuring it for reeling purposes. In the warm, Southern States the dry-heat choking can be accomplished by simple exposure to the sun. This was done by M. L. Prevost in Southern California, and is practised habitually by Mr. Crozier in Silkville, Kansas, who says: "Here the cocoons need only to be fully exposed to the rays of the sun, from 9 o'clock in the morning till 4 o'clock in the afternoon. Two or three days of such exposure are sufficient. But, as some time strong wind can annihilate the effect of the sun's warmth, it is good to have for that purpose long boxes, 4 feet wide, sides 6 inches high, to be covered with glass frames. This will increase the heat, and, by absorbing the air of the box, stifle your chrysalis most surely." Ed. Müller, another California grower (Nevada County), always makes use of this method of stifling by the sun's rays, but says that the glass cover of the box should be left open a crack to allow the evaporation of the moisture, which otherwise would collect in large drops upon the glass, and, falling back upon the cocoons, would keep them moist for a longer time. Do not, however, allow the ants to creep in at the crack, as they too will penetrate the cocoon to feed upon the chrysalis.

In the colder climates it has been suggested that the chrysalis could be well choked, with no injury to the cocoons, by placing them in a vacuum box and exhausting the air. Chloroform has been used to a certain extent, and experiments are now being made in France with sulph-hydric acid gas, a vapor which is evolved from the mixture of dilute sulphuric acid and sulphide of iron; also with bisulphide of carbon.

EGG-LAYING—REPRODUCTION.

In from 12 to 20 days from the time when the worm commenced to spin, the moths will begin to issue from the cocoons laid aside for breeding purposes. They issue most abundantly during the early morning hours, from four to eight o'clock, and as they appear, they should be taken by the wings and the sexes kept apart for a short time. The males may be readily distinguished from the females by their broader antennæ and smaller bodies, as also by the incessant fluttering of their wings. The females remain comparatively quiet, their abdomens being heavy and distended with eggs. A few hours after issuing, the sexes, in equal numbers, may be placed together, great care having been taken

to destroy any that are at all deformed, in order to keep the breed as fine as possible. They should be placed upon paper or card-board, and the room should be kept as dark as possible in order that the males shall not uncouple themselves. For the complete impregnation of the eggs, the sexes should be kept together six hours, neither more nor less, and occasionally visited in order to replace those males which may have become separated. Should there, on this day, more males than females issue, the superfluous males may be put in a closed box and kept till the next day, when the state of things may be reversed. Should there, on the other hand, be a superfluity of females, a sufficient number of the strongest and most vigorous males should be uncoupled at 4 hours and placed with the unpaired females for 6 hours more. As the pairs are uncoupled at the end of 6 hours, care should be taken to injure neither sex. The female should be held by the wings with one hand and the abdomen of the male gently pressed with the other. The males may then be laid aside in a box, as there may be use for them before all the moths have appeared. After all the females are impregnated, however, they may be thrown away. These last, as soon as separated, should be placed for a few minutes upon sheets of blotting-paper, where they will free themselves of a quantity of greenish-yellow fluid. From the blotting-paper they should be transferred to trays lined with cloth upon which the eggs are to be laid. This cloth should be of the smoothest sort of woollen stuff rather than of linen or paper, if it is desired to remove the eggs at a future time, as they will stick so fast to the latter that it will be difficult to remove without bruising them. Upon these trays they may be placed in rows, and will immediately commence depositing. It is advisable to tip up the trays at one end so that they incline a little, as the moths are then more apt to lay their eggs uniformly. They should also be kept in the dark, in accordance with the nocturnal habit of the moth. The temperature of the room should be kept at about 75°, and plenty of air given during oviposition. All of the thoroughly impregnated eggs will be laid in about 24 hours, and the moth should be removed after that length of time. She may continue depositing a short time longer, but the eggs should be kept by themselves and not mixed with the others. It will be well, also, if the best and purest breed be desired, to keep the eggs of those moths which were coupled with males that had been used before, separated from the eggs laid by those which were coupled with virgin males. "The eggs are best preserved on the cloth where originally deposited, as they are protected by a natural coating of varnish, and, being fastened, the worms, when hatching, eat their way out better. For commercial purposes, however, they are usually detached during the winter by immersing the cloth containing them in cool soft water for a few moments; the moisture being then drained off by means of blotting-paper, and the eggs gently removed with a paper-knife. They are then washed in soft water, thoroughly dried, and put away for keeping. All eggs which swim on the surface are considered bad and discarded. The Japanese producers sell their eggs on cards or cartoons made of coarse silk. The cards are placed in wooden frames, the rims of which are varnished, so that the moths—disliking the varnish—are made to confine their eggs upon the cards, which are consequently covered in a very regular and uniform manner."

The egg retains the characteristic color of the unimpregnated ones—light yellow—for 12 or 15 days, when it gradually acquires the gray, lavender, or greenish tint of impregnation. The moths live but a few days after having perpetuated their kind.

RÉELING.

“If the mere rearing of the worm and the production of the cocoons is simple, the reeling of the silk is by no means so, as the greatest skill is required to accomplish the work properly, and the value of a hank of silk depends as much on the skill of the reeler as upon the quality of the original thread. In the best cocoons the silk will measure upwards of a thousand feet in length, and, though it appears single, it is in reality composed of two threads, which are glued together and covered as they issue from the spinneret of the moth with a glossy varnish, which enables the worm to fasten the silk where it wills, and which is soluble in warm water.”

In countries where there are steam-reeling establishments, it is generally more profitable for the small raiser to sell his cocoons, and not go to the trouble and expense of reeling by hand; but, unfortunately, there is no market for choked cocoons in this country, and the raiser will be under the necessity of reeling his own silk, if he wishes to make the most of them. It will be desirable, then, in this paper, to state the facts and principles which should govern the unwinding and reeling, for the benefit of those who may wish to use single basins and reels worked by hand. In the great reeling districts of France, everything is brought to such perfection in the *filatures*, or reeling establishments, by the aid of steam, that the hand-reels have there almost gone out of use. But most of the silk is unwound by hand-power in China, and excellent silk may be made by dexterous management with a good hand-reel.

“Raw silk is classified into organzine, tram, and floss. Organzine is considerably twisted and is the choicest. Tram is made from inferior cocoons and is but slightly twisted. Floss is made of the loose silk, carded and spun like cotton or wool.

“The thread of silk as it unwinds from the cocoon is valueless for manufacturing purposes, several of them combined going to make the staple of commerce. The persons employed in unwinding silk are mostly women, one standing or sitting before each basin, of which she has entire charge. The basin is made of copper, and, in the large establishments, the water in each basin is heated by steam, at the control of the operator. The cocoons are plunged into the water, when it is near the boiling point, and moved about so that the gum which fastens the threads becomes uniformly and thoroughly softened. They are then beaten with a small birchen broom, having the tips split, so that the loose threads readily fasten to them. After beating a short time, the operator gets all the cocoons fastened, and, taking the bundle of threads, shakes the cocoons till each hangs but by a single one. She now takes up five or more threads (*brins*), according to the quality of silk wanted, unites them, and introduces the combined staple or strand (*fil*) into a little glass eye on one side of the basin. She then forms a second similar strand and introduces it into a second eye on the other side. The strands are then

brought together, twisted several times, separated above the twist, and introduced into two other glass eyes or ringlets through which they are led, one to each end of the reel or *tambour*, which is kept revolving in a steady, rapid manner, and to which is also given a certain back-and-forth side motion. The great object in reeling is to get the threads uniform, rounded, well joined, properly freed from moisture, and so crossed on the reel that they will not stick or glaze, as it is termed. These objects are attained by the twisting and the to-and-fro lateral movement of the reel, as also by properly regulating the distance between reel and basin. The uniformity of the thread depends on the skill of the operator, who must supply a new thread as soon as one begins to give out. This is called nourishing the silk, and is done by dexterously casting, with the thumb, the new thread upon the combined strand, to which it immediately adheres. In this she must use much judgment, for the silk of a cocoon gradually gets lighter and finer as it approaches the end, and the uniformity of strand does not entirely depend on the uniformity in number of the individual threads forming it. Whenever the silk rises in locks the temperature of the water is known to be too hot, and when it unwinds with difficulty the temperature is, on the contrary, too low. The operator is supplied with a skimmer with which to remove all chrysalides and refuse silk; also, with a basin of cold water in which to cool her fingers, which are being constantly dipped in the hot basin. This constitutes the whole operation of unwinding, but before the skeins, as they come from the reel, are ready for the manufacturer they must undergo still further manipulation. The staple is first passed through a cleanser, consisting of a clasp lined with cloth, which catches any loose silk or other matter that may be adhering to it. It is then further cleansed and purged by being passed through four similar cleansers (*purgeurs*), then twisted about 500 times to the yard, then doubled and again twisted about 400 times to the yard. It is finally run on to reels about $1\frac{1}{2}$ feet in diameter, and taken off and twisted in a peculiar knot or hank. Through all these operations the oscillating to-and-fro lateral motion is kept up, so as to produce the diagonal crossing of the strands, and it will be readily understood that each staple is, in the end, composed of ten or more of the simple threads first spun by the worm.

"The loose or flock silk, together with all which, from one cause or another, cannot be reeled, is soaked in water for three days, boiled for one half hour in clear lye, washed in rain-water, and when dry, carded, and spun it makes an inferior floss silk."

In order to better illustrate these principles, we have introduced figures of three reels. Fig. 5 is the old Piedmontese reel, which for many years held its supremacy, and which has been the foundation of numerous improved reels. It is formed of four bars or arms, and is usually about a yard in circumference. One of these bars is provided with hinges so that it may fold inwards towards the center when it becomes necessary to slacken the silk in order to carefully remove it from the reel. The lateral movement so necessary in order that the consecutive circles shall not stick together is gained in rather a clumsy manner by means of cogs. The strands after being twisted several

times at *c*, in order to round and smooth the threads by friction, are passed over the guides *b b*, which are inserted in the traversing bar *a*. To this bar

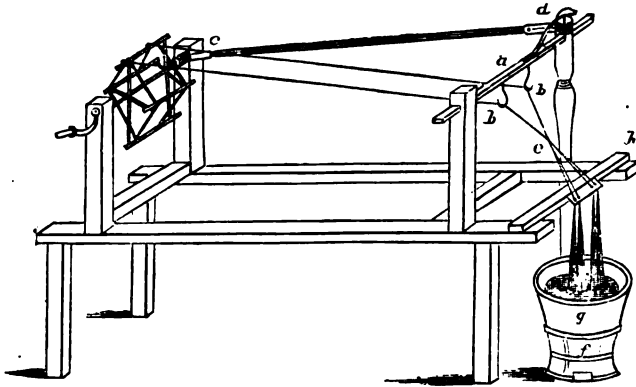


FIG. 5.—Piedmontese reel.

the lateral movement is imparted by a pin connected with the outer circumference of the cog-wheel *d*. This is connected at *e* with the cog revolving with the shaft of the reel. *f* represents a charcoal-furnace under the copper basin *g*. The cross-bar *h*, to which are attached the glass eyes through which the threads from the cocoons first pass, is usually widened into a shelf, upon which to place the broom and the cold water for the reeler's fingers.

Figs. 6 and 7 represent, respectively, a plane view, seen from above, and a longitudinal vertical section of an old French reel differing somewhat from the Piedmontese, and the principles of which are employed in all the improved reeling establishments of to-day.

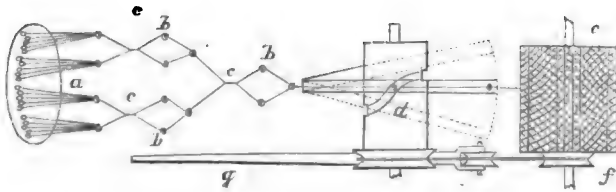


FIG. 6.—Plane view of old French reel.

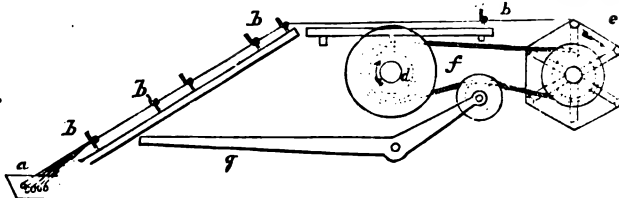


FIG. 7.—Section of old French reel.

a. The oblong water-basin heated by a charcoal-furnace or by steam, and frequently divided by partitions.

b b. Hooked wires or eyelets to guide several threads and keep them apart.

c c. Points where the threads are twisted upon each other to clean their surfaces and compactly round them.

d. Cylinder on shaft, with a spiral groove in its surface, in which fits a pin from the traversing-bar, thus giving the lateral movement to the thread which goes through a guider on the front end of the bar, which moves through the arc of a circle.

e. The reel.

f. Pulleys which transmit by a belt the rotary motion of the cylinder *d* to the reel *e*, that connected with the reel being the smaller of the two.

g. Friction lever, for tightening or slackening the endless cord, in setting or stopping the winding operation. There is usually a series of such reels in one apartment, driven by the same motive power, but each of them, as has been shown, can be stopped at pleasure. In case the reels are driven by a steam-engine, stop-cocks and pipes are so arranged that the water in every basin can be instantly or gradually heated by steam. If desired to run the reel by hand, a handle can be placed upon the shaft of the cylinder *d*, or of the reel *e*.

Figure 8 represents a hand reel, of much the same style as the last, set up and ready for work. This machine was illustrated in the *American Artisan* for February, 1874, in the course of an article by W. V. Andrews, of Brooklyn. It is as good a hand reel as is now in use, though it is made on the same principle as the old French reel of forty years ago.

a. Tin basin with copper bottom for holding the water in which the cocoons are boiled, fitting tightly over the tray *b*.

b. Square tin tray for reception of cocoons, &c.

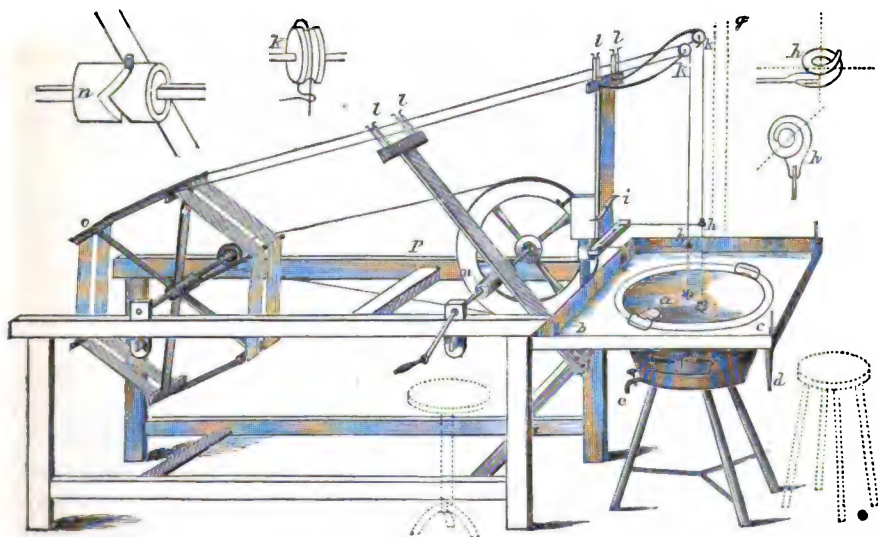


FIG. 8.—Improved Lombardy hand reel.

c. Short stick inserted in a holder, on which the ends of the cocoons are wound, so as to be ready for use.

e. Cock to let off water from the basin. This should be done every night after use.

f. Door of furnace lined with fire-bricks, wherein the charcoal fire is lighted to heat the water in *a*.

g. Flue-pipe to carry off fumes; this, as supplied, is short; the length and direction in which it may be carried varying in every case. It is necessary that all the charcoal fumes should be carried either into a chimney or into the open air.

h h. Glass eyes on wire holders, through which the threads from the cocoons pass upward to the pulleys at *k*. It is of importance that the glass eyes should be so placed that the threads pass upward in a straight line from the water to the pulleys at *k*, and also from the pulleys to the top of the wheel at *o* (except so far as when diverted laterally by the long guider at *ll*); friction is thus reduced to a minimum, and the elasticity of the thread preserved.

i. A former arrangement for twisting the threads one upon the other; this is now discontinued as unnecessary, since the twist given to the threads at *k* and continued downward to the point *h* effects its purpose with a minimum of friction, and produces a superior thread. This twist is effected by the very simple method of passing one thread round the other, as shown in the small drawing of the pulley *k*.

k k. Rollers or pulleys revolving on bent wire stands, over which the threads pass.

ll. Porcelain tubes on wire holders, between which the threads pass to reach *o*. Glass eyes may be substituted for the first pair of these tubes with equal advantage.

n n. A grooved arrangement by means of which the long guider working to and fro distributes the thread to the reel "in the cross." Unless the thread is thus wound "on the cross," it cannot be unwound at the mills when required to be thrown, and is, therefore, unsalable.

o. The top of the reel on which the silk is wound. One of the arms is furnished with the screw-hinge attached, by means of which the length of the arm is diminished to take off the silk.

p. Handle of the machine. (The letter in the cut is in the wrong place.)

The adult reeler sits on the stool in front of the cocoons, and the other stool is occupied by the child who turns the crank.

FOOD PLANTS.

The traditional food plant of the Silkworm is the Mulberry (botanical genus *Morus*). There are two species of Mulberry indigenous to the United States, namely, the Red Mulberry (*Morus rubra*) and the Small-leaved Mulberry (*Morus parvifolia*), neither of which is suitable Silkworm food. I have tried in vain to rear the worms upon *rubra*, but they either refuse its leaves entirely or dwindle and soon die upon it. The imported species which are most used are the white (*M. alba*), the *Multicaulis*, and the black (*M. nigra*). This last is inferior to the other two as Silkworm food.

The Mulberry grows readily, being easily propagated by cuttings or layers or from the seed. The White Mulberry, in particular, grows well from cuttings, and this is perhaps the readiest and most economical method of planting to secure a stock.

The cuttings should be started in rows, 3 or 4 inches apart, in ground prepared by deep plowing and harrowing. They should be about 6 inches long, and should be cut just before an eye in every case. They should be almost entirely buried. The quickest way to get a supply of leaves is to grow dwarfs. Set out the young trees from the nursery in rows 10 to 15 feet apart, and 6 to 8 feet between the rows, and form the crown of the tree by cutting down to a foot or so from the ground. The height of the tree and its form are easily regulated by pruning, and upon this process depend not only the vigorous growth of the tree, but also the ease with which the leaves may be gathered when desired. The pruning may be done in February or March, either every year or every other year. All dead twigs and dried bark should be removed and the limbs kept as smooth as possible, as this greatly facilitates picking. The best time for planting is in the fall, from frost until December, and in the spring, from March until May.

For growing standard high trees, a practical raiser gives the following directions: The cutting should remain two years in the nursery without pruning. The third year it is cut down close to the ground and transplanted. The finest shoot is then allowed to grow, and in good land it will reach a height of 8 or 10 feet in one season. The fourth year it is cut back to 6 feet or thereabouts. Then, the three or four terminal buds only being allowed to grow, all others are removed as often as they appear, by passing the hand along the stem.

The *Moretti*, a variety of the White Mulberry, is profitably grown in the form of a hedge, and the large size of its leaves makes it a very desirable variety.

OSAGE ORANGE.—The cultivation of the Osage Orange (*Machura aurantiaca*) is so well understood in this country that there is no need of giving detailed instructions on the subject. Very generally used as a hedge plant in those sections of the country which are particularly adapted to silk culture, its leaves may at once be obtained without any special investment of capital. Indeed, as the hedges need trimming, the cutting off of the new year's growth, as the leaves may be wanted for feeding purposes, is a saving rather than an expenditure. Those who use this plant as Silkworm food must, however, bear in mind that the shoots from a hedgerow become very vigorous and succulent by the time the worms are in the last age. These more milky and succulent terminal leaves should be thrown aside and not used, as they are apt to induce flaccidity and disease.

In avoiding these more tender leaves, and using only the older and firmer ones, especially when the worms are large, consists the whole secret of the successful rearing of Silkworms on this plant; and if care be had in this respect there will be no appreciable difference in the silk crop from Osage Orange as compared with that from Mulberry.

Should the worms, from whatever cause, hatch before either Mulberry or Osage Orange leaves can be obtained, they may be quite successfully fed, for a few days, upon well-dried lettuce leaves. It will, however, be worse than a waste of time to attempt to feed them entirely on these leaves, or, in fact, on any other plants than the two here recommended.

GLOSSARY OF TERMS USED.

- Age.* The interval between any two molts.
- Alimentary canal.* The food-canal; a straight, simple tube, running from one end of the body to the other, and which it is impossible to subdivide into gullet, stomach, and intestine.
- Alkaline.* Having the opposite reactions to an acid.
- Anal horn.* The horn upon the posterior end of the body of the worm.
- Annals.* Those races which produce but one brood in a year.
- Antennae.* The feathery feelers upon the head of the moth.
- Bivoltins.* Those races producing two broods in one year.
- Bombycidae.* The family of moths, commonly known as "spinners," to which the Silkworm moth belongs.
- Botrytis bassiana.* The fungus causing muscardine.
- Brin.* The French term for a single thread from the cocoon.
- Carneous.* Flesh-colored.
- Choked cocoons.* A term applied to those cocoons in which the chrysalis has been killed.
- Chrysalis.* The third or restful stage of the insect, or that between the worm and the moth; enclosed in the cocoon.
- Cocoon.* The silken covering with which the worm surrounds itself before passing into the chrysalis state.
- Cocoonery.* The name applied to a room or building used for the spinning of worms.
- Dacey.* A Bengalese race of worms producing eight broods each year.
- Dorsal vessel.* The heart, extending from one end of the body to the other, just under the skin of the back.
- Epidiœotic.* A term having the same significance with lower animals as *epidemic* with man.
- Fil.* The French term for the combined threads as they come from the reel.
- Filature.* The French name for a reeling establishment.
- Floss silk.* Raw silk made from the loose material of the outer cocoon and from pierced cocoons, &c. It is carded and spun like cotton or wool.
- Gattine.* An old name for a mild phase of the disease known as pebrine.
- Grasserie.* A Silkworm disease allied to jaundice.
- Green cocoons.* A name frequently applied to fresh or unchoked cocoons. Should be avoided, except where it has reference to cocoons of a green color.
- Greens.* A name applied to those races making cocoons of a greenish tint.
- Integument.* Skin or outer covering.
- Labium.* The under lip upon which is situated the spinneret.
- Larva.* The second or worm stage of the insect.
- Lepidoptera.* Name of the Order to which the Silkworm belongs.
- Lusettes.* A name applied to the worms which die from being unable to molt.
- Magnanerie.* Cocoonery.
- Moretti.* A variety of the White Mulberry discovered in 1815 by Professor Moretti, of Pavia.
- Mori.* The scientific specific name for the Silkworm.
- Morus.* The botanical generic name of the Mulberry.
- Multicaulis.* A species of *Morus* often called the Chinese Mulberry.
- Muscardine.* A Silkworm disease of a fungus nature, characterized in the text.
- Spinneret.* A tube projecting from the lower lip, and through which the silk issues.
- Organzine.* The choicest kind of raw silk, made from the best cocoons, and considerably twisted.
- Ovipositing.* Laying the eggs.
- Panhistophylon.* Name given by Lebreton to the floating corpuscles in the bodies of worms affected by *pebrine*.
- Pebrine.* A Silkworm disease characterized in the text.
- Pod.* The compact portion of the cocoon, which is used for reeling purposes.
- Polyvoltins.* A term applied indiscriminately to all races which produce more than one brood in a year.

Pro-legs. The ten non-jointed legs under the sixth, seventh, eighth, ninth, and last joints of the body of the worm.

Psorospermie. Ordinary name for the floating corpuscles in the bodies of worms affected by pébrine.

Purgeur. The French word for *cleanser*—a clasp lined with cloth, through which the skeins of raw silk are passed to remove loose silk and foreign particles.

Quadrivoltins. Those races which produce four broods in one year.

Raw silk. Silk reeled from the cocoons before being spun and woven.

Seed. The eggs in bulk.

Sericaria. A generic name proposed by Latreille, and to which the Silkworm is referred by modern writers.

Sickness. The period of molting.

Spiracles. The breathing-holes of the insect; one row of nine down each side of the body.

Spores. The germinating seed of fungi.

Tambour. The French for *reel*.

Tram. Raw silk reeled from inferior cocoons and but slightly twisted.

Transformation. The change from one state to another, as from worm to chrysalis or from chrysalis to moth.

Trevoltins. Those races of Silkworms of which there are three broods in one year.

Whites. Those varieties having white cocoons,

Yellows. Those varieties having yellow cocoons.

DEPARTMENT OF AGRICULTURE.
SPECIAL REPORT—No. 12.

INVESTIGATION
OF
DISEASES OF SWINE,
AND
INFECTIOUS AND CONTAGIOUS DISEASES
INCIDENT TO
OTHER CLASSES OF DOMESTICATED ANIMALS.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1879.

TABLE OF CONTENTS.

	Page.
Investigation of Swine-Plague—Introductory	5
Report of Dr. Detmers	19
Report of Dr. Law	56
Report of Dr. Voyles	112
Report of Dr. Salmon	123
Report of Dr. Dunlap	135
Report of Dr. Dyer	156
Report of Dr. Payne	165
Report of Dr. McNutt	173
Report of Dr. Hines	177
Correspondence showing the prevalence of diseases among domesticated animals	186
Correspondence relating to the more common diseases affecting farm animals ..	211
Pleuro-pneumonia or contagious lung fever of cattle	219
A strange disease among cattle in North Carolina	253
Rinderpest, or Cattle Plague	255
Glanders	257

LIST OF ILLUSTRATIONS.

	Page.
SWINE PLAGUE.—Plate I. Right lung (half-size) of experimental pig, No. VII.....	26
Plate II. Enlarged section of right lung of same pig.....	28
Plate III. Ulcerous tumors on mucous membrane of intestines.....	30
Plate IV. The same, projecting above surface.....	32
Plate V. The same, showing concavity in center.....	34
Plate VI. The same, showing different view.....	36
Plate VII. The same, showing different view.....	38
Plate VIII. Ulcerous tumors on mucous membrane of the stomach.....	40
Chart, illustrating microscopical investigations.....	53
Plate IX. Fig. 1. Microscopic section through skin and slough. Fig. 2. Microscopic section of skin in purple spot.....	60
Plate X. Microscopic section showing exudation in the cecal mucous membrane beneath an ulcer.... Microscopic section through skin, showing hair follicle containing effused blood. The bristle was detached in mounting.....	75 75
Plate XI. Microscopic section of lung with exudate filling the air-cells, and thickening the alveolar walls. Microscopic section of congested gut, showing villi with excess of granular matter, stained in hematoxylin. Detached round cells.....	75 75
Plate XII. Microscopic section of lung, showing thickened walls of air-cells; blocked vessels; exudate into cell-walls, and a few of the cells..... Microscopic section from ear, showing cartilage and skin with broken surface, and crust-entangling bristles.....	75 75
Plate XIII. Forms assumed in rapid succession by bacterium; also head and tail of lung worm.....	64
Plate XIV. Ova, hooks, and head and tail of lung worms....	66
Plate XV. Fig. 1. Microscopic section of diseased liver. Fig. 2. Microscopic section of lung in catarrhal pneumonia. Fig 3. Microscopic section of intestine in "hog-cholera," showing healthy condition.....	116
GLANDERS.—Plate I, Fig. I. Development of glanders-cells of connective-tissue corpuscles in the mucous membrane of the septum. Fig. II. Microscopic cut from gray-yellowish glanders. Fig. III. Development of glanders-cells of epithelium elements in the pulmonary nodules.....	257
Plate II. Fig. IV. Lower end of the septum with glanders-nodules and ulcers (natural size). Fig. V. Transversal cuts through the gray nodules in the mucous membrane of the septum (natural size). Fig. VI. Piece of the lower border of a lung, cut surface (natural size). Fig. VII. Also a piece of the lower border of a lung, cut surface (natural size).....	257

INVESTIGATION OF SWINE PLAGUE.

INTRODUCTORY.

Congress having previously appropriated the sum of \$10,000 for defraying the expenses of a commission to investigate and determine the causes producing, and, if possible, discover remedies for, some of the more contagious and destructive diseases incident to domesticated animals, early in August last the Commissioner of Agriculture appointed examiners in the States of New York, Indiana, Illinois, Iowa, Kansas, Missouri, and North Carolina, to conduct such investigation. Still later in the season, on receiving information that not only diseases among swine were prevailing to an alarming extent in Virginia, but that a fatal disease resembling pleuro-pneumonia or contagious lung fever was destroying a good many valuable dairy cattle in some localities of that State, an additional examiner was appointed and instructed to investigate and report upon all the facts connected with the condition of both classes of animals in the infected districts of this State.

In the preliminary report of the Commissioner of Agriculture on the subject of diseases of domesticated animals, a tabular statement gives the total value of farm animals lost in the United States during the year 1877, principally from infectious and contagious diseases, at \$16,653,428. These losses were based upon as accurate returns as could be obtained in the absence of an absolute census, but as they included data from but eleven hundred and twenty-five counties (about one-half the whole number of counties in the United States), the above sum falls far below the aggregate losses for that year. About two-thirds of this sum was occasioned by the loss of swine by diseases presumed to be of an infectious and contagious character. Notwithstanding these maladies had their origin near a quarter of a century ago, and had rapidly spread from one State and one county to another, there was great diversity of opinion as to their contagious or non-contagious character. Many intelligent farmers and stock-growers insisted that they were not transmissible from one animal to another, while perhaps equally as large a number contended that the diseases were of a highly infectious and contagious nature. As this was regarded as one among the most important facts to be determined by the investigation, two of the examiners devoted most of their time to experiments looking to a solution of this problem.

As the number and value of the annual losses among swine were much heavier than among all other classes of domesticated animals com-

bined, the Commissioner deemed it best to devote the greater portion of the limited sum placed at his disposal to an investigation of the fatal diseases affecting this class of farm animals.

The preliminary investigation instituted and conducted under the supervision of this department, in the fall and winter of 1877-'78, established the fact that diseases prevail among these animals much more extensively during the late summer and early fall months than at other seasons of the year, and for this reason the examiners selected to conduct the investigation were employed for periods ranging from one to three months. It was assumed, and the subsequent history of the disease proved the assumption to be well founded, that the reduced temperature of the late fall and early winter months would cause an abatement of the disease, and in a measure deprive the examiners of subjects with which to continue their experiments. While, therefore, the very severe weather of the past winter caused a great reduction in the number of animals affected, the disease was not eradicated, nor did its fatality seem to be lessened. The spread of the infection from one herd to another was greatly diminished; but, in infected herds, where the malady was still prevailing when cold weather set in, there appeared but little difference in the rapidity of the transmission of the disease, from one animal to another, in the same herd. Dr. H. J. Detmers, V. S., of Chicago, who conducted his investigations and made his experiments in one of the worst infected of the many large hog-growing districts in Illinois, writing under date of January 7 last, speaks as follows of the effects of severe frosts on the spread of the disease:

Since my last letter the weather has continued extremely cold. Where I now am, in Lee County, some five or six miles west of Dixon, the thermometer indicated at seven o'clock on the morning of January 2, 28° below zero, and on the next morning 24° below zero. At present—to-day, yesterday and day before—the weather is a little milder. To-day it tried to snow a little; otherwise the sky has been clear every day. The wind is, and has been, west, except yesterday afternoon, when it was almost due south. Swine-plague during this cold weather does not seem to spread either so readily or so rapidly from one farm to another as a few months ago; but as to its spreading from one animal to another in the same herd in which it previously existed no difference can be observed. It seems to be just as fatal as in August, and its course, on the whole, is probably more acute, as severe affections of the lungs and of the heart are more frequent, a fact easily explained in the habits of swine crowding together and lying on top of each other in their sleeping places when the temperature is very low.

Dr. James Law, of Ithaca, N. Y., whose investigations have been solely confined to experiments intended to further establish the contagious and infectious character of the disease, the period of its incubation, &c., confirms the statement of Dr. Detmers, *i. e.*, that the severe frosts of winter do not destroy the germs of the malady but simply retard their conveyance from one herd to another. In a letter of recent date, forwarded since his report was completed, Dr. Law says:

I have demonstrated that the freezing of the virulent matter does not destroy its activity, and that the virus loses nothing in potency by preservation for one or two

months closely packed in dry bran. The same may be inferred of all other situations when it is closely packed and where the air has imperfect access. These two last points are of immense importance as bearing on the question of the preservation of the poison in infected pens and yards alike in winter and in summer, to say nothing of its possible conveyance in fodder, &c. The different modes in which the disease may be conveyed in the wet and dry condition, and in the bodies of rabbits, and probably sheep, and other animals, speak in the strongest terms against keeping up the production of the poison by preserving sick animals, unless where they can be secluded in thoroughly disinfected buildings in which even the air shall be constantly charged with disinfectants.

In most of the States in which investigations have been made, the examiners have found the symptoms and *post-mortem* appearances of the disease the same, and hence agree as to the propriety of designating the affection under the head of a general disorder. Dr. Detmers has, therefore, given the disease the name of "Swine-plague," and Dr. Law has named it "Hog-fever." While either designation would seem to be eminently proper, that of "Swine-plague" will no doubt be generally adopted.

As in almost all general disorders, a certain variety of organs were found affected and diseased. Marked changes and extravasations in various parts of the body were observed, and inflammation of the lungs and large intestines was usually present. The heart, the pleura, the eyes, the epidermis, and many other important organs showed either slight or more serious affections, and in almost every case tested with the thermometer the temperature was found to be above normal heat before any other symptom of the disease was in the least apparent. In every herd where the disease had prevailed to any considerable extent, no case was found where death had occurred from a local malady, but all the lesions and appearances unmistakably indicated the existence of the general disorder. In but few cases was death found to have resulted from the affection of any single organ, but on the contrary seemed to have been the result of the various organic changes observed.

Dr. Detmers says that the morbid process, although in all cases essentially the same, is not restricted to a single part or organ, or to a set of organs, but can have its seat almost anywhere—in the tissue of the lungs; in the pleura and pericardium; in the heart; in the lymphatic system; in the peritoneum; in all mucous membranes, especially in those of the intestines; in the liver; in the spleen, and even in the skin. Only the pulmonic tissue and lymphatic glands are invariably affected.

The most constant and unvarying symptom of the disease is observed in the increased temperature of the body. Indeed, one of the examiners regards it as highly probable that a high temperature may exist several weeks before other symptoms are manifested, and that the disease may in some cases even be confined to and run its course in the blood without a localization in any other organ or organs. A few isolated cases are noted where this symptom was lacking, but it may have been present in a mild form before other symptoms were observed. The external

symptoms of the disease, which were found to be almost identical in all the widely-separated localities in which examinations were made, were a dullness of the eyes, the lids of which are kept nearer closed than in health, with an accumulation of secretion in the corners. There is hanging of the head, with lopped ears, and an inclination to hide in the litter and to lie on the belly and keep quiet. As the disease advances, the animal manifests more or less thirst, some cough, and a pink blush or rose-colored spots, and papular eruption appears on the skin, particularly along the belly, inside of the thighs and fore legs, and about the ears. There is accelerated respiration and circulation, increased action of the flanks in breathing, tucked-up abdomen, arched back, swelling of the vulva in the female as in heat; occasionally, also, of the sheath of the male, loss of appetite, and tenderness of the abdomen, sometimes persistent diarrhea, but generally obstinate constipation. In some cases large abraded spots are observed at the projecting points of the body, caused by separation and loss of the epidermis. In such cases a slight blow or friction on the skin is sufficient to produce such abrasions. In many cases the eruption, blush, and spots are entirely absent; petechia are formed in only about one-third of the cases. In some cases there is considerable inflammation of and discharge from the eyes. Some animals emit a very offensive odor even before death. In large herds, where the disease prevails extensively, this offensive effluvia can be detected for a great distance to windward. In nearly all cases there is a weakness or partial paralysis of the posterior extremities, and occasionally this paralysis is so complete in the first stages of the disease as to prevent walking or standing.

As symptoms of special diagnostic value, which are scarcely ever absent in any case, the following are mentioned: Drooping of the ears and of the head; more or less coughing; dull look of the eyes; staring appearance of the coat of hair; partial or total want of appetite for food; vitiated appetite for excrements; rapid emaciation; great debility; weak and undecided, and frequently staggering, gait; great indifference to surroundings; tendency to lie down in a dark corner, and to hide the nose and even the whole head in the bedding; the specific offensive smell, and the peculiar color of the excrements. This last symptom is always present, at least in an advanced stage of the disease, no matter whether constipation or diarrhea is existing. Among other characteristic symptoms, which are not present in every animal, may be mentioned frequent sneezing; bleeding from the nose; swelling of the eyelids; accumulation of mucus in the inner canthi of the eyes; attempts to vomit, or real vomiting; accelerated and difficult breathing; thumping or spasmodic contraction of the abdominal muscles (flanks), and a peculiar, faint, and hoarse voice in the last stages of the disease.

The duration of the disease varies according to the violence and seat of the attack and the age and constitution of the patient. Where the attack is violent, and its principal seat is located in one of the vital

organs—such as the heart—the disease frequently terminates fatally in a few days, and sometimes even within twenty-four hours; but when the attack is of a mild character, and the heart is not seriously affected, and the animal is naturally strong and vigorous, one or two weeks usually intervene before death ensues. If the termination is not fatal, convalescence requires an equal and not unfrequently a much longer time. A perfect recovery seldom occurs; in most cases some lasting disorder remains behind and more or less interferes with the growth and fattening of the animal. Those that do recover make but very poor returns for the food consumed; hence from a pecuniary standpoint it makes but little difference to the owner whether the animal recovers or not. The attack is always more violent and fatal when large numbers of animals are closely confined together in small and dirty inclosures or in illy ventilated and filthy pens.

The disease can have its seat in many different organs or parts of the body, and therefore produces a great variety of morbid changes. This accounts for its different aspect in different animals. In some cases the principal seat of the disease may be in the organs of respiration and circulation, and in others in the intestinal canal and organs of digestion. Death may therefore be the result of different causes in different cases. In some cases it results from a cessation of the functions of the heart, the lungs, &c., and in others it is in consequence of the inability of entirely different organs to perform their allotted functions. This being the case, the *post-mortem* appearances would necessarily greatly vary, but in all animals similarly affected the lesions and morbid changes were found identical.

Perhaps the most important point to be determined by this investigation was the contagious or non-contagious character of the disease. In order to do this a series of experiments were instituted and conducted solely with this end in view, by Dr. Detmers, of Illinois, and Dr. Law, of Cornell University, New York. These experiments resulted in determining the fact that the disease is both infectious and contagious, and that it is not confined alone to swine, but that other animals may contract it in a mild form and retransmit it to swine in its most virulent and malignant character.

On the 6th day of September, Dr. Detmers fed a portion of the stomach, the cæcum, and the spleen of a pig that had died on that day to two healthy pigs. On the 19th of the same month they showed signs of illness, and the symptoms continued to grow in intensity until the 23d, when, finding that the animal must die in a few hours, one of them was killed by bleeding. The other pig was found dead in the pen on the morning of September 30. The symptoms and *post mortem* appearances were those of swine-plague, as they revealed the same lesions as those observed in an examination of the pig from which the diseased products had been taken for the purpose of infection. On the 24th day of September, the day following the death of the first pig, a healthy pig of

mixed Poland-China and Berkshire was confined in the same pen with the sick pig that died on the 30th of that month. It showed no signs of sickness until the 2d day of October, when the first symptoms of the disease were observed. It continued to grow rapidly worse, and was found dead in its pen on the morning of the 11th, nine days after the first symptoms were observed.

Experiments were made with a large number of other animals to test the infectious and contagious character of the plague. These experiments included the confinement of healthy with sick animals, and the inoculation of healthy animals with the diseased products of those suffering with the fever. In almost every case, as will be seen from his detailed report, Dr. Detmers was successful in transmitting the disease from sick to healthy animals.

The microscopic investigations of Dr. Detmers also revealed some important facts. His discovery of a new order of *bacteria* or *bacillus*, which he names *bacillus suis*, as it is common only to this disease of swine, and his failure to inoculate healthy animals with virus from which these germs had been removed by filtration and otherwise, would lead to the conclusion that these microphytes are the true seeds of the hog fever.

Dr. Detmers invariably found these germs, in one form or another, in all fluids. So constantly were they observed in the blood, urine, mucus, fluid exudations, &c., and in the excrements and in all morbidly affected tissues of diseased animals, that he regards them as the true infectious principle. They would seem to undergo several changes, and to require a certain length of time for further propagation; therefore, if introduced into the animal organism, a period of incubation or colonization must elapse before the morbid symptoms make their appearance. These germs were generally found in immense numbers in the fluids, but more especially in the blood and in the exudations of the diseased animals. With the proper temperature and the presence of a sufficient amount of oxygen they soon develop and grow lengthwise by a kind of budding process. A globular germ, constantly observed under the microscope, budded and grew under a temperature of 70° F. twice the original length in exactly two hours, and changed gradually to rod-bacteria or *bacilli*. Under favorable circumstances these *bacilli* continue to grow in length until, when magnified 850 diameters, they appear from one to six inches long. A knee or angle is first formed where a separation is to take place, and then a complete separation is effected by a swinging motion of both ends. After the division, which requires but a minute or two after this swinging motion commences, the ends thus separated move apart in different directions. These long bacteria seem pregnant with new germs; their external envelope disappears or is dissolved, and then the numerous bacillus germs become free, and in this way effect propagation. Some of the *bacilli* or rod-bacteria move very rapidly, while others are apparently motionless. A certain degree of heat would seem to be necessary for their propagation, as, under the microscope, the motion in-

creases and becomes more lively if the rays of the light, thrown upon the slide by the mirror, are sufficiently concentrated to increase the temperature of the object. Another change observed by Dr. Detmers, but the cause of which he was not able to determine, was observed in the fact that the globular bacteria or bacillus germs commence to bud or grow, when, very suddenly, their further development ceases, and partially developed *bacilli* and simple and budding germs congregate to colonies, agglutinate to each other, and form longer or smaller irregularly-shaped and apparently viscous clusters. These clusters are frequently found in the blood and in other fluids, and invariably in the exudations of the lungs; and in the lymphatic glands in pulmonic exudation and in blood serum this formation can be observed under the microscope if the object remains unchanged for an hour or two. In the ulcerous tumors on the intestinal mucous membrane but few of these clusters will be found, but the fully-developed *bacilli*, many of which appear very lively, are always exceedingly numerous. These tumors or morbid growths in the intestines seem to afford the most favorable conditions for the growth and development of the *bacilli* and their germs. The presence of such immense numbers of these microphytes and their germs in the excrements and other morbid products of swine leads Dr. Detmers to regard them, beyond doubt, as the principal disseminators of the plague. Whether these colonies or viscous clusters are instrumental in bringing about the extensive embolism of the lungs and other tissues by merely closing the capillary vessels in a mechanical way, or whether the presence, growth, development, and propagation of the *bacilli* and their germs produce peculiar chemical changes in the composition of the blood, thereby disqualifying it from passing with facility through the capillaries, or which cause a clotting and retention of the same in the capillary system, Dr. Detmers is not able positively to decide. He is of the opinion, however, that these colonies or viscous clusters of bacillus germs and partially developed *bacilli* cause sufficient obstruction of the capillaries to produce fatal embolism.

The vitality of the *bacilli* and bacillus-germs is not very great, except where preserved in a substance or fluid not easily subject to decomposition; for instance, in water which contains a slight admixture of organic substances. Where contained in such a fluid and preserved in a vial with a glass stopper, they will remain for at least five or six weeks in nearly the same condition, or develop very slowly, according to the amount of oxygen and degree of temperature maintained. In an open vessel the development is a more rapid one. If oxygen is excluded, or the amount available is exhausted, no further change takes place. In the water of streamlets, brooks, ditches, ponds, &c., their vitality is retained or preserved for some time. In fluids and substances subject to putrefaction, they lose their vitality and are destroyed in a comparatively brief period; at least they disappear as soon as those fluids and substances undergo decomposition. In the blood they disappear as soon

as the blood-corpuscles commence to decompose or putrefy. They are also destroyed if brought in contact with or acted upon by alcohol, carbolic acid, thymol, iodine, &c. The destruction of these germs by decomposition would seem to account for the harmless nature of thoroughly putrid products when consumed by healthy animals. (See drawings, *bacilli* and *bacillus-germs*.)

Dr. Law also discovered bacteria in the blood of pigs suffering with the disease, and in one case, on the second day before death, he found the blood swarming with them, all showing very active movements. (See drawings, Plate xiii, Fig. 3.) The blood from another pig, which had been inoculated from this one, showed the same living, actively-moving germs in equal quantity. They were further found in the blood of a rabbit and of a sheep inoculated from the first-mentioned pig. In an abscess of a puppy, which had also been inoculated, the germs were abundant. In the examination of blood from healthy pigs the microscope failed to reveal the presence of these organisms. Dr. Law states that in his experiments the greatest precautions were taken to avoid the introduction of extraneous germs. The caustic potash employed was first fused, then placed with reboiled distilled water in a stoppered bottle which had been heated to red heat. The glass slides and cover-glasses were cleaned and burned, the skin of the animal cleaned and incised with a knife that had just been heated in the flame of a lamp. The caustic solution and the distilled water for the immersion-lens were reboiled on each occasion before using, and finally the glass rods employed to lift the latter were superheated before being dipped in them. On different occasions, when the animal was being killed, the blood from the flowing vessels was received beneath the skin into a capillary tube which had just been purified by burning in the flame of a lamp. With these precautions Dr. Law thinks it might have been possible for one or two bacteria to get in from the atmosphere, but this would not account for the swarms found as soon as the blood was placed under the microscope.

The most scrupulous care was observed by Dr. Law in his experiments in inoculation. The isolated and non-infected locality where the experiments were conducted offered special advantages for a series of experiments of this character, as there were no large herds of diseased and exposed swine, and, consequently, no danger of accidental infection from other sources than the experimental pens. The number of animals subjected to experiment was limited by the necessity for the most perfect isolation of the healthy and diseased, for the employment of separate attendants for each, and for the disinfection of instruments used for scientific observations, and of the persons and clothes of those necessarily in attendance. The experimental pens were constructed on high ground in an open field, with nothing to impede the free circulation of air. They were large and roomy, with abundant ventilation from back and front, with perfectly close walls, floors, and roofs, and in cases

where two or more existed in the same building, the intervening walls were constructed of a double thickness of matched boards, with building pasteboard between, so that no communication could possibly take place except through the open air of the fields. When deemed necessary, disinfectants were placed at the ventilating orifices. On showing the first signs of illness, infected pigs were at once turned over to the care of attendants delegated to take charge of these alone. The food, utensils, &c., for the healthy and diseased animals were kept most carefully apart. When passing from one to the other for scientific observations, the healthy were first attended, and afterward the diseased, as far as possible in the order of severity. Disinfection was then resorted to, and no visit was paid to the healthy pigs until after a lapse of six or eight hours, with free exposure to the air in the interval. In the pens the most scrupulous cleanliness was maintained, and deodorizing agents used in sufficient quantities to keep them perfectly sweet.

The experiments of Dr. Law have shown the period of incubation to vary greatly, though in a majority of cases it terminated in from three to seven days after inoculation. One animal sickened and died on the first day, three on the third, two on the fourth, one on the fifth, two on the sixth, four on the seventh, and one each on the eighth and thirteenth days respectively. Referring to experiments of others for determining the period of incubation, Dr. Law says that Dr. Sutton, observing the result of contact alone in autumn, sets the period at from thirteen to fourteen days; his own observations in Scotland, in summer, indicated from seven to fourteen days; Professor Axe, in summer, in London, concluded on from five to eight days; Dr. Budd, in summer, from four to five days; and Professor Osler, in autumn, at from four to six days. Dr. Detmers gives the period of incubation from five to fifteen days, or an average of about seven days. A comparison of these results would seem to indicate that both extremes have been reached.

In experimenting in this direction, Dr. Law first sought to ascertain the tenacity of life of the dried virus. Some years ago Professor Axe had successfully inoculated a pig with virus that had remained dried upon ivory points for twenty-six days. In order to carry this experiment still further, Dr. Law inoculated three pigs with virulent products that had been dried on quills for one day, one with virus dried on a quill for four days, one for five days, and one for six days. These quills had been sent from North Carolina and New Jersey, wrapped in a simple paper covering, and were in no way specially protected against the action of the air. Of the six inoculations, four took effect. In the two exceptional cases the quills had been treated with disinfectants before inoculation, so that the failure was anticipated.

Three pigs were inoculated with diseased intestine which had been dried for three and four days respectively. The intestine was dried in the free air and sun, and the process was necessarily slower than in the case of the quills, where the virus was in a very thin layer, hence there

was more time allowed for septic changes. In all three cases the inoculation proved successful. This experiment would prove that the morbid products, even in comparatively thick layers, may dry spontaneously, and retain their vitality sufficiently to transmit the disease to the most distant States.

Another pig was inoculated with a portion of moist diseased intestine sent from Illinois in a closely-corked bottle. The material had been three days from the pig, and smelt slightly putrid. The disease developed on the sixth day. A second pig was inoculated with blood from a diseased pig that had been kept for eleven days at 100° F. in an isolation apparatus, the outlets of which were plugged with cotton wool. Illness supervened in twenty-four hours.

A solitary experiment of Dr. Klein's having appeared to support the idea that the blood was non-virulent, Dr. Law tested the matter by inoculating two pigs with the blood of one that had been sick for nine days. They sickened on the seventh and eighth days respectively, and from one of these the disease was still further propagated by inoculating with the blood three other animals. Notwithstanding the success of these three experiments, Dr. Law is still doubtful of the blood being virulent at all stages of the disease.

But one or two experiments were instituted by Dr. Law to test the question of infection through the air alone. A healthy pig placed in a pen between two infected ones, and with the ventilating orifices within a foot of each other, front and back, had an elevated temperature on the ninth, tenth, and eleventh days, with lameness in the right shoulder, evidently of a rheumatic character. On the twenty-fourth day the temperature rose two degrees, and remained 104° F. and upward for six days, when it slowly declined to the natural standard.

A healthy pig was placed in a pen from which a sick one had been removed thirteen days before. The pen had been simply swept out, but subjected to no disinfection other than the free circulation of air, and as the pig was placed in the pen on December 19, all moist objects had been frozen during the time the apartment had stood empty. The pig died on the fifteenth day, without having shown any rise of temperature, but with *post-mortem* lesions that showed the operation of the poison. Dr. Law refers to this case as an example of the rapidly fatal action of the disease, the poison having fallen with prostrating effect on vital organs—the lungs and brain—and cut life short before there was time for the full development of all the other lesions. It fully demonstrates the preservation of the poison in a covered building at a temperature below the freezing point.

Perhaps the most important experiments conducted by Dr. Law were those relating to the inoculation of other animals than swine with the virus and morbid products of pigs suffering with the plague, and the transmission of the disease from these animals back to healthy hogs. A merino wether, a tame rabbit, and a Newfoundland puppy were in-

oculated with blood and pleural fluid containing numerous actively moving bacteria, taken from the right ventricle and pleuræ of a pig that had died of the fever the same morning. Next day the temperature of all three was elevated. In the puppy it became normal on the third day, but on the eighth day a large abscess formed in the seat of inoculation and burst. The rabbit had elevated temperature for eight days, lost appetite, became weak and purged, and its blood contained myriads of the characteristic bacteria. The wether had his temperature raised for an equal length of time, and had bacteria in his blood, though not so abundantly as in that of the rabbit. The sheep and rabbit had each been unsuccessfully inoculated on two former occasions with the blood of sick pigs, in which no moving bacteria had been detected. Subsequently, after two inoculations with questionable results, made with the blood of sick pigs in which no microzymes had been observed, Dr. Law succeeded in inoculating a rabbit with the pleural effusion of a pig that had died the night before, and in which were numerous actively moving bacteria. Next day the rabbit was very feverish and quite ill, and continued so for twenty-two days, when it was killed and showed lesions in many respects resembling those of the sick pigs. The blood of the rabbit contained active microzymes like those of the pig. On the fourth day of sickness the blood of the rabbit containing bacteria was inoculated on a healthy pig, but for fifteen days the pig showed no signs of illness. It was then reinoculated, but this time with the discharge from an open sore which had formed over an engorgement in the groin of the rabbit. Illness set in on the third day thereafter and continued for ten days, when the pig was destroyed and found to present the lesions of the disease in a moderate degree. A second pig, inoculated with frozen matter which had been taken from the open sore on the rabbit's groin, sickened on the thirteenth day thereafter, and remained ill for six days, when an imminent death was anticipated by destroying the animal. During life and after death it presented the phenomena of the plague in a very violent form.

The results of these experiments have convinced Dr. Law, as they must convince others, that the rabbit is itself a victim of this disease, and that the poison can be reproduced and multiplied in the body of this rodent and conveyed back with undiminished virulence to the pig. Dr. Klein had previously demonstrated the susceptibility of mice and guinea pigs to the disease. The rabbit, and still more the mouse, is a frequent visitor of hog pens and yards. The latter eats from the same feeding troughs with the pig, hides under the same litter, and runs constant risk of infection. Once infected, they may carry the disease to long distances. During the progress of severe attacks of the disease, their weakness and inability to escape will make them an easy prey to the omnivorous hog; and thus sick and dead alike will be devoured by the doomed swine.

Dr. Law says that the infection of these rodents creates the strongest

presumption that other genera of the same family may also contract the disease, and by virtue of an even closer relation to the pigs, may succeed in conveying the malady to distant herds. The rat is suggested as being almost ubiquitous in piggeries, and more likely than any other rodent to contract and transmit the disease to distant farms. In order to test its susceptibility to the poison, Dr. Law inoculated a rat with the virus from a sick pig, but unfortunately the subject died on the second day thereafter. The body showed slight suspicious lesions, such as congested lungs with considerable interlobular exudation, congested small intestines, dried-up contents of the large intestines, and sanguinous discoloration of the tail from the seat of inoculation to the tip. With the fresh congested small intestine of the rat he inoculated one pig, and with the frozen intestine one day later he inoculated a second. The first showed no rise of temperature, loss of appetite, or digestive disorder; but on the sixth day pink and violet eruptions, the size of a pin's head and upwards, appeared on the teats and belly; and on the tenth day there was a manifest enlargement of the inguinal glands. In the second pig inoculated, the symptoms were too obscure to be of any real value. Dr. Law will continue his experiments with this rodent.

In addition to the above, Dr. Law experimented on two sheep of different ages, an adult merino wether and a cross-breed lamb, and in both cases succeeded in transmitting the disease. With the mucus from the anus of the wether he inoculated a healthy pig, which showed a slight elevation of temperature for five days, but without any other marked symptoms of illness. Eleven days later it was reinoculated with scab from the ear of the lamb, and again three days later with anal mucus from the sheep. The day preceding the last inoculation it was noticed that the inguinal glands were much enlarged, and in six days thereafter the temperature was elevated and purple spots appeared on the belly. At the time that Dr. Law closed his report this fever had lasted but a few days, but he regards the symptoms, taken in connection with the violent rash and the enlarged lymphatic glands, as satisfactory evidence of the presence of the disease. It can, therefore, be affirmed of the sheep as of the rabbit, that not only is it subject to this disease, but that it can multiply the poison in its system and transmit it back to the pig.

Among the later experiments by Dr. Law was one inaugurated with the view of testing the vitality of frozen products of the disease. This point was briefly alluded to above, but its importance would seem to call for further attention. In two cases healthy pigs were inoculated with virulent products which had been frozen hard for one and two days respectively. In both instances the resulting disease was of a very violent type, and would have proved fatal had it been left to run its course. The freezing had failed to impair the virulence of the product; on the contrary, it had only sealed it up to be opened and given free course on the recurrence of warm weather. Once frozen no change could take place

until it was again thawed out, and if it was preserved for one night unchanged in its potency, it would be equally unaffected after the lapse of many months, provided its liquids had remained in the same crystalline condition throughout. It is in this way, no doubt, that the virus is often preserved through the winter in pens and yards, as well as in cars and other conveyances, to break out anew on returning spring. The importance of this discovery, as applied to preventive measures, cannot be overestimated. Infected yards and other open and uncovered places may not be considered safe until after two months' vacation in summer, and not then if sufficient rain has not fallen during the interval to insure the soaking and putrid decomposition of all organic matter near the surface. This will be made more apparent by reference to an experiment which resulted in the successful inoculation of pigs with virus that had been kept for a month in dry wheat bran. In winter, on the other hand, the yard or other open and infected place may prove non-infecting for weeks and even months and yet retain the virus in readiness for a new and deadly course as soon as mild weather sets in. Safety under such circumstances is contingent on a disuse of the premises so long as the frost continues, and for at least one month or more thereafter. Even during the continuance of frost such places are dangerous, as the heat of the animal's body or of the rays of the sun at midday may suffice to set the virus free.

Several of the examiners treat at length of hygienic and sanitary measures, and the attention of the reader is directed to their detailed reports, which will be found below, without further comment.

2 SW



INVESTIGATION OF SWINE-PLAGUE.

REPORT OF DR. H. J. DETMERS, V. S.

Hon. WM. G. LEDUC,
Commissioner of Agriculture :

SIR: Having been appointed by you as one of the inspectors to make an investigation of the diseases prevailing among swine, I forwarded to you my written acceptance, immediately after I received my appointment, on July 29, 1878, and took at once the necessary steps to obtain reliable information as to the localities where the disease of swine, known to the farmers as "hog-cholera," was at that time prevailing. I made also such other preparations as I deemed necessary to successful investigation, and provided myself with a good Hartnack microscope, divers chemicals and medicines, a clinical thermometer, &c. Among all the places and localities at which the disease, as reported, was very frequent, I selected Champaign, Champaign County, Illinois, as affording the greatest facilities for the intended investigation, or the most suitable basis for my operations, and repaired to that place on the second day of August. I found what I expected, *i. e.*, numerous cases of disease in the vicinity of Champaign and Urbana, and offers of assistance by F. W. Prentice, M. D., and M. R. C. V. S., who is lecturer on veterinary science in the Illinois Industrial University at Urbana, and of Prof. T. J. Burrill, M. A., who is professor of botany and microscopist in the same institution. Dr. Prentice had even the kindness of offering to me, for experimental purposes, the free use of his veterinary infirmary buildings. That offer, of course, was accepted. Besides that, Dr. Prentice, who is a very able and well-educated veterinary surgeon, has assisted me otherwise very essentially in my work, and took charge of my experimental animals whenever I was obliged to be absent for a short time. I am, therefore, very much indebted to him for his valuable help and kind assistance. Professor Burrill has assisted me in my microscopical examinations.

Arrived at Champaign I made my plans as to the manner in which to proceed with my investigation. Knowing that an enemy can only be conquered by being well known, I determined to ascertain first the real nature of the disease I had to deal with. That accomplished, I proposed to direct my attention exclusively to investigating and ascertaining the causes, reasoning that, if the causes are known, it cannot be very difficult to devise proper and efficient means of prevention, and, perhaps, remedies that will effect a cure. At any rate, a knowledge of the causes of a disease affords not only a sound, but in fact the only basis of successful prevention and rational treatment. This plan I have executed as far as circumstances and the time granted have permitted me to do.

In order to become thoroughly acquainted with the nature of the so-called "hog-cholera," or more appropriately "swine-plague," called also typhoid, pig-typhoid, enteric fever, pneumo-enteric fever, hog or swine disease, &c., I have made during the time from August 2 to

November 1, 54 visits to 26 different herds of diseased swine, and 53 *post-mortem* examinations, and have examined microscopically the blood, diverse other fluids, morbid products, and tissues of 42 sick or dead animals.

For the purpose of ascertaining the cause or causes of the disease, I have also made numerous experiments, a detailed account of most of which will be found in this report. After having inquired into the causes, I have made other experiments in regard to prevention and treatment.

The following may be considered as the result of my investigations:

1. DESCRIPTION OF SWINE-PLAGUE.

The disease, commonly known as "hog-cholera" to the farmers, but which may, more appropriately, be called swine-plague—a name which I shall use exclusively hereafter—is a disease *sui generis*, peculiar to swine, is neither cholera nor anthrax; it somewhat resembles the enteric fever, or dothineria, of man, but is not identical with the same; is communicated from one animal to another by direct and indirect infection; has usually a subacute course; is extremely fatal, especially among young animals; and exempts neither sex, age, nor breed, but seems to prefer, in its attacks, for reasons hereafter to be explained, large herds, and is always most fatal in such sties, pens, and yards in which many animals are crowded together. Some individual animals seem to have more predisposition to the disease than others. The morbid process, although in all cases essentially the same, is not restricted to a single part or organ, or to a set of organs, but can have its seat almost everywhere—in the tissue of the lungs, in the pleura and pericardium, in the heart, in the lymphatic system, in the peritoneum, in all mucous membranes, especially in those of the intestines, in the liver, in the spleen, and even in the skin. Only the pulmonic tissue and the lymphatic glands are invariably affected.

2. THE SYMPTOMS.

The symptoms, although presenting certain characteristics, observed more or less in the affected animals, vary considerably in different cases, even in one and the same herd, but still more so in different herds, and in different seasons and localities. The causes of these differences will hereafter be fully explained.

To convey a better idea of the features of swine-plague, as presented in the living animal, I shall first give an outline of all the symptoms observed in a large number of hogs and pigs, and shall append, in order to show what combinations may occur in an individual animal, a description of the symptoms presented by some of my experimental pigs.

Swine-plague announces its presence very often by a cold shivering, lasting from a few minutes to several hours, frequent sneezing, and more or less coughing. The symptoms of shivering and sneezing are generally noticed. At the beginning of the disease the temperature of the body seems to be increased. The thermometer indicated from 104° to 106° F. Still, not much reliance can be placed on the temperature, as indicated by the thermometer. In some cases it was found to be very high—in one case as high as 111° F.—and in others below normal. It was always more or less variable, and has been found decreasing at the very height of the disease. I have come to the conclusion that in diseases of swine thermometry is of a very doubtful practical value, be-

cause to ascertain the temperature of a hog, that is not extremely low or in a dying condition, by introducing a thermometer into the rectum, requires the use of force, because a hog or pig can very seldom be persuaded to submit to that operation without struggling and without being held; and struggling, according to my observation, increases the temperature of such an irritable animal immediately. The general appearance of the animal, if correctly analyzed, is of much more diagnostic and prognostic value than the differences of temperature as indicated by the thermometer. In diseases of swine the latter is, at best, a nice and interesting plaything in the hands of the inexperienced.

The first symptoms are usually followed within a short time by a partial, and afterwards by a total loss of appetite; a rough and somewhat staring appearance of the coat of hair; a drooping of the ears (characteristic); loss of vivacity; attempts to vomit (in some cases); a tendency to root in the bedding, and to lie down in a dark and quiet corner; a dull look of the eyes, which not seldom become dim and injected; swelling of the head (observed in several cases); eruptions on the ears and on other parts of the body (quite frequent); bleeding from the nose (in a few cases); swelling of the eyelids, and partial or total blindness (in five or six cases); dizziness or apparent pressure upon the brain; accelerated and frequently laborious breathing; more or less constipation, or, in some cases, diarrhea; a gaunt appearance of the flanks; a pumping motion of the same at each breath; rapid emaciation; a vitiated appetite for dung, dirt, and saline substances; increased thirst (sometimes); accumulation of mucus in the canthi of the eyes (very often at an early stage of the disease); more or less copious discharges from the nose, &c. The peculiar offensive and fetid smell of the exhalations and of the excrements may be considered as characteristic of the disease. This odor is so penetrating as to announce the presence of the disease, especially if the herd of swine is a large one, at a distance of half a mile or even farther, provided the wind is favorable. If the animals are inclined to be costive, the dung is usually grayish or brownish black, and hard; if diarrhea is present the feces are semi-fluid, and of a grayish-green color, and contain, in some cases, an admixture of blood. In a large number of cases the more tender portions of the skin on the lower surface of the body, between the hind legs, behind the ears, and even on the nose and on the neck, exhibit numerous larger or smaller red spots, or (sometimes) a uniform redness (Red Soldier of the English). Toward a fatal termination of the disease this redness changes frequently to purple. A physical exploration of the thorax reveals, if pleuritis is existing, frequently a plain rubbing sound. As the morbid process progresses the movements, of the sick animal become weaker and slower; the gait becomes staggering and undecided; the steps made are short, as if the animal was unable to advance its legs without pain; sometimes lameness, especially in a hind leg (not very often), and sometimes great weakness in the hind quarters, or partial paralysis (oftener) make their appearance. The head, if the animal is on its legs, seems to be too heavy to be carried, and is kept in a drooping position with the nose almost touching the ground; but as a general rule the diseased animals are usually found lying down in a dark and quiet corner with the nose hid in the bedding. If a fatal termination is approaching, a very fetid diarrhea (usually one or two days before death) takes the place of the previous costiveness; the voice becomes very peculiar, grows very faint and hoarse; the sick animal manifests a great indifference to its surroundings, and to what is going on; emaciation and general debility increase very fast; the skin (es-

pecially if the disease has been of long duration) becomes wrinkled, hard, dry, parchment-like, and very unclean; a cold clammy sweat breaks out (observed several times, once as early as forty-eight hours before death), and death ensues either under convulsions (comparatively rare), or gradually and without any struggle. A peculiar symptom, which, however, has been observed only once, in a litter of nine pigs, about a week old, at the beginning, or in the first stage of the disease, may here be mentioned. It consisted in a peculiar and constant twitching of all voluntary muscles. All nine pigs died, and I am sorry that I had no opportunity to make any *post mortem* examination.

In some cases numerous eruptions (ulcerous nodules) appeared on the tender skin on the lower surface of the body between the legs and behind the ears, and in a few cases whole pieces of skin (in one case as large as a man's hand) were destroyed by the morbid process, sloughed off, and left behind a raw, ulcerous surface. In another case a part of the lower lip, of the gums, and of the lower jaw-bone had undergone ulcerous destruction.

Wherever pigs or hogs had been ringed, the wounds thus made showed a great tendency to ulcerate. In several cases the morbid process had caused sufficient ulcerous destruction to form an opening directly into the nasal cavities large enough to enable the animal to breathe through, instead of through the nostrils, which had become nearly closed by swelling and by exudations and morbid products adhering to their borders.

In those few cases in which the disease has not a fatal termination the symptoms gradually disappear, coughing becomes more frequent and easier; the discharges from the nose, for a day or two, become copious, but soon diminish, and finally cease altogether; appetite returns, and becomes normal; the offensive smell of the excrements disappears; sores or ulcers that may happen to exist show a tendency to heal; the animal becomes more lively, and gains, though slowly, in flesh and strength; but some difficulty of breathing, and a short, somewhat hoarse, hacking cough remains for a long time.

Symptoms of special cases.—Experimental pigs Nos. 5 and 6, both of the same litter, and about fifteen weeks old, were fed on the sixth day of September with the stomach, cut in pieces, the cæcum, and the spleen of experimental pig No. 2, which had died the same day.

September 7.—Pig No. 5 coughs a little, but eats well; pig No. 6 has a slight catarrh; some yellow mucus in inner canthus of one eye.

September 8.—Both pigs the same as yesterday.

September 9.—Both pigs have very good appetite.

September 10.—Both pigs seem to be as well as possible; consume all their food greedily.

September 11.—Both pigs apparently healthy; neither one shows any symptoms of disease.

September 12.—Both pigs evidently sick; they are tardy in their movements; their ears are drooping; their appetite diminished. Pig No. 5 made attempts to vomit.

September 13.—Both pigs, but especially pig No. 5, are very sick; take scarcely any food; show a tendency to hide themselves in a corner; coat of hair looks rough and staring; flanks are thin; accumulation of mucus in the inner canthi of the eyes. No. 6 has discharges from the nose, especially from the right nostril.

September 14.—Pig No. 5, both eyes nearly closed; is weak, though not very; emaciates rapidly; appetite is poor. No. 6 has its eyes yet open; otherwise about the same as No. 5.

September 15.—Pig No. 5, eyes closed; is very loath to move, and shows plain symptoms of pneumonia. Pig No. 6, too, shows symptoms of pneumonia, but they are less pronounced; is without appetite, and just as much emaciated as No. 5. The skin of both animals is hard and dry; and their coat of hair rough and staring; their bowels are costive; but little dung is voided. Both animals betray plain indications of pain and suffering; neither one seems to be very thirsty.

September 16.—Pig No. 5 very weak, breathes one hundred times per minute; its flanks are working forcibly; slight lameness in left hind leg. Pig No. 6 is also very weak, but is yet able to run; passed a large quantity of urine of a bright yellow color. The appetite of both pigs for food is reduced to nothing, but both exhibit a vitiated appetite, and eat each other's dung, or their own, as soon almost as it drops. The skin is very hard to the touch, parchment-like, and seems to stick to the bones. In the evening pig No. 5 is extremely weak; is scarcely able to move; its breathing is difficult and distressing. No. 6 is about the same as in the morning.

September 17.—Pig No. 5 shows symptoms of dropsy in the chest, and breathes with great difficulty, about one hundred times per minute. In the evening the pumping motion of the flanks is increased, but the respiration is slower—about fifty-six breaths per minute. Pig No. 6 is a little more lively than No. 5, but also very sick, and has no appetite. Both pigs failed to void any dung from 8 o'clock a. m. to 6 o'clock p. m.

September 18.—Pig No. 5 exceedingly emaciated, some rattling noise in the respiratory passages. Pig No. 6 about the same as yesterday.

September 19.—Pig No. 5 emaciated to the utmost, but otherwise apparently not worse. Pig No. 6 shows apparent improvement; is a little livelier than before; has some appetite; consumed one ear of corn during the last twenty-four hours. In the evening pig No. 5 breathes with the greatest difficulty, one hundred and four times per minute. No. 6 unchanged.

September 20.—Pig No. 5 very sick; breathes with great difficulty. No. 6 apparently improving.

September 21.—Pig No. 5 just alive. Both pigs have been lying nearly all day in one corner of their sty, their noses buried in the bedding. In the evening pig No. 5 is perspiring; sweat cold and clammy.

September 22.—Pig No. 5 breathes sixty-four times per minute, with jerking motions of the flanks, and so far has been more or less constipated, but now has diarrhea; feces grayish-green, semi-fluid, and exceedingly fetid. Pig No. 6 is less emaciated than No. 5, has no diarrhea, and eats a little. Urine of No. 5, examined under the microscope, contained innumerable bacillus-germs (micrococci of Heliier), and a few *bacilli suis*.* (See drawing 1, fig. 1.)

September 23.—Pig No. 5 a mere skeleton, and extremely weak; breathes only forty-eight times per minute. Pig No. 6 not quite so low; breathes only thirty-six times per minute. In afternoon pig No. 5 too weak to stand on its legs; breathes fifty-two times per minute; is sweating; the sweat cold and clammy. Seeing that the animal could not possibly live till next morning, and desiring to make the *post-mortem* examination before putrefaction should set in, I killed pig No. 5 by bleeding at 6 o'clock p. m. (As to result of *post-mortem* examination, see chapter on Morbid Changes.)

September 24.—Pig No. 6 very sick; eats scarcely anything.

* I have chosen the name "*bacillus suis*" because the *bacilli*, as will appear hereafter, seem to be peculiar to swine-plague, and have not been before named as far as I have been able to learn.

September 25.—Pig No. 6 shows slightly increased appetite, and fully as much, if not more, liveliness than on any day last week. It almost seems as if some real improvement is going on, notwithstanding very serious morbid changes must have taken place.

September 26.—Pig No. 6 eats some in the morning, but does not seem to care for any food at noon; appears to be a trifle bloated; droops its head, and holds its nose to the ground.

September 27.—Pig No. 6 decidedly worse; breathes seventy-two times per minute; head drooping; nose to the ground; back arched; skin very dry and hard to the touch; no appetite whatever.

September 28.—Pig No. 6, which was very low last night, has somewhat recuperated, and is moving again; consumed some water, and also a little food.

September 29.—Pig No. 6 exceedingly emaciated and very weak; breathes thirty-eight times per minute; holds its nose persistently to the ground, and has no appetite whatever.

September 30.—Found pig No. 6, at 7 o'clock a. m., lying dead in a corner of its sty. (See chapter on Morbid Changes as to result of *post mortem* examination.)

It may be well to add a brief account of the symptoms and the progress of the disease, as observed in experimental pig B, a sow pig, about fourteen weeks old, and of mixed Poland China and Berkshire stock. Pig B was put in pen No. 3, together with pig No. 6, on September 24. The same was and remained perfectly healthy until October 2, when the first symptoms of disease made their appearance. I find in my diary the following notes:

October 2.—Pig B shows symptoms of sickness; sneezes; has an eruption on both ears; is not quite as lively as it used to be; appetite is diminished; curl is out of its tail.

October 3.—Pig B has but little appetite; is decidedly sick. In afternoon shows unmistakable symptoms of sickness; ears are drooping; no appetite; great tendency to lie down in a corner; hides its nose in the bedding.

October 4.—Pig B about the same as yesterday; has eaten a little.

October 5.—Pig B hides its nose in the bedding; has no appetite whatever; emaciation has taken place. B, although a week ago a better and heavier pig than C, a full sister, and of the same litter, is now considerably lighter.

October 7.—Pig B very sick; still, seems to have a desire to eat, but takes hold of an ear of corn so feebly as to make it appear that it has not sufficient strength in the jaws to shell the corn; gave it, therefore, shelled.

October 8.—Pig B very sick; hides in its corner; ears are cold; other parts of the body warm; no appetite; great indifference to surroundings; emaciation rapid.

October 9.—Pig B about the same as yesterday.

October 10.—Pig B is getting worse; does not eat anything.

October 11.—Pig B found dead in its pen in the morning.

These three cases show that the symptoms vary in different cases, and that those which are constant can scarcely be considered as very characteristic. Still, if the various symptoms presented by an individual animal are taken as a whole, a diagnostic mistake is scarcely possible.

The diagnosis is very easy, especially if swine-plague is known to be prevailing in the neighborhood, or has already made its appearance in the herd, and if the anamnesis, and the fact that many animals are

attacked at once, or within a short time and in rapid succession, are taken into consideration. As symptoms of special diagnostic value, scarcely ever absent in any case, may be mentioned the drooping of the ears and of the head; more or less coughing; the dull look of the eyes; the staring appearance of the coat of hair; the partial or total want of appetite for food; the vitiated appetite for excrements; the rapid emaciation; the great debility; the weak and undecided, frequently staggering, gait; the great indifference to surroundings; the tendency to lie down in a dark corner, and to hide the nose, or even the whole head in the bedding, and particularly the specific, offensive smell, and the peculiar color of the excrements. This symptom is always present, at least in an advanced stage of the disease, no matter whether constipation or diarrhea is existing. As other characteristic symptoms, though not present in every animal, deserve to be mentioned frequent sneezing; bleeding from the nose; swelling of the eyelids; accumulation of mucus in the inner canthi of the eyes; attempts to vomit, or real vomiting; accelerated and difficult breathing; thumping or spasmodic contraction of the abdominal muscles (flanks) at each breath, and a peculiar, faint and hoarse voice in the last stages of the disease.

3. THE PROGNOSIS AND TERMINATION.

The prognosis is decidedly unfavorable, but is the more so the younger the animals or the larger the herd. Among pigs less than three months old the mortality may be set down as from 90 to 100 per cent.; among animals from three to six or seven months old the same is from 75 to 90 per cent.; while among older animals that have been well kept and are in good condition, and naturally strong and vigorous, the mortality sometimes may not exceed 25 per cent., but may, on an average, reach 40 to 50 per cent. The prognosis is comparatively favorable only in those few cases in which the morbid process is not very violent; in which the seat of the disease is confined to the respiratory organs and to the skin; in which any thumping or pumping motion of the flanks is absent; and in which the patient is, naturally, a strong, vigorous animal, not too young and in a good condition; in which, further, where but a few, not more than two or three, animals are kept in the same pen or sty, and receive nothing but clean uncontaminated food and pure water for drinking, and in which a frequent and thorough cleaning of the sty or pen prevents any consumption of excrements.

The duration of the disease varies according to the violence and the seat of the morbid process, the age and the constitution of the patient, and the treatment and keeping in general. Where the morbid process is violent, where its principal seat is in one of the most vital organs—in the heart, for instance—where a large number of animals are kept together in one sty or pen, where sties and pens are very dirty, or where the sick animals are very young, the disease frequently becomes fatal in a day or two, and sometimes even within twenty-four hours. On the other hand, where the morbid process is not very violent or extensive, where the heart, for instance, is not seriously affected, and where the patients are naturally strong and vigorous, and well kept in every respect, it usually takes from one to three weeks to cause death. If the termination is not a fatal one, the convalescence, at any rate, requires an equal and probably a much longer time. A perfect recovery seldom occurs; in most cases some lasting disorders—morbid changes

which can be repaired but slowly or not at all—remain behind, and interfere more or less with the growth and fattening of the animal.

From a pecuniary standpoint, it makes but little difference to the owner whether a pig affected with this plague recovers or dies, because those which do survive usually make very poor returns for the food consumed, unless the attack has been a very mild one.

4. MORBID CHANGES.

The morbid process, although everywhere essentially the same (see chapter on Contagion, Causes, and Nature of Morbid Process), can have its seat in many different organs or parts of the body, and produces, therefore, a great variety of morbid changes. The disease, in consequence, very often presents a somewhat different aspect in different animals. In some cases the principal seat of the morbid process is in one organ or set of organs (organs of respiration and circulation, for instance), and in others in entirely different parts (intestinal canal and organs of digestion, &c.) Death, therefore, has very often a different cause in different cases; in some cases it results from a cessation of the functions of the heart, the lungs, &c., and in others it is the consequence of an inability of entirely different organs to perform their functions, of the digestive apparatus, for instance.

But few morbid changes have ever been found entirely absent at any of the fifty-three *post-mortem* examinations made since August 2, and may, therefore, be considered as a constant occurrence. All others have been found absent a larger or smaller number of times. These constant morbid changes consist—

1. In a more or less perfect hepatization of a larger or smaller portion of the lungs, or a more or less extensive accumulation of blood, blood-serum and exudation in the pulmonic tissue. In some cases the morbid changes (hepatization) found in the lungs are so extensive as to cause the latter, if thrown into water, to sink like a rock, but in other cases the hepatization is limited to about one-sixth or one-eighth of the whole pulmonic tissue. In some cases, especially those in which the morbid changes were of a recent origin, no real hepatization, fully developed, had yet been effected; the lungs were merely gorged with exudation or blood-serum; the texture was not yet destroyed or seriously changed, but innumerable small red spots or specks, indicating incipient embolism, were plainly visible to the naked eye. (See photograph, Plate I, half-size lungs, right side of experimental pig No. VII, and photograph, Plate II, enlarged section of same lungs.) In other cases a part of the exudation had changed, organized, or become a part of the tissue, and had caused the latter to become more or less perfectly impermeable to air. In some lungs hepatization was found only in certain insulated places, while in others the hepatization extended uninterruptedly over whole portions. In all these cases in which the hepatization was very limited, it was found principally in the anterior lobes. In some animals (that is in those which had been sick for some time), old or so-called gray, more recent or brown, and very new or red hepatization were frequently found side by side, or in more or less distinctly limited patches, showing plainly that the morbid changes had not been produced at once, but at several intervals. In others, usually the upper parts of the same lungs, the exudation or blood-serum was but recently deposited, and was yet in a fluid condition. The blood-serum, examined under the microscope, invariably contained, besides blood-corpuscles, numerous *bacilli suis*, some moving and some without motion, and innumerable bacillus germs, of which some had budded,

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SWINE FEVER.

Report Commissioner of Agriculture for 1878.

Plate I.



Half size of right lung of experimental pig. No.VII.



some were budding, and others had conglomerated. (See drawing II, figs. 3 and 4, and drawing III, fig. 1.)

2. The lymphatic and mesenteric glands were found invariably more or less enlarged. In some cases they presented even a brownish or blackish color, and contained not only deleterious matter, but even effusions of blood in sufficient quantities to push aside the normal glandular tissue. Whether neoplastic formations (a proliferous growth of cells) had taken place I have not ascertained, but have not the least doubt that it had. Under the microscope, particles of lymph and glandular substance, taken from the interior of the lymphatic gland, presented, besides normal tissue and lymph-corpuscles, a few blood-corpuscles, some granular detritus, and innumerable *bacilli* and bacillus-germs. (See drawings III and IV, figs. 5 and 3.) As lymphatic glands always most conspicuously enlarged and morbidly changed, may be mentioned the superficial and deep inguinal and the axillary glands, the bronchial and mediastinum glands in the chest, and the mesenteric, gastric, gastro-epiploic, and hepatic glands in the abdominal cavity.

3. The trachea and the bronchial tubes contained in all cases more or less of a frothy mucus—in some cases the bronchial tubes were full of it—which consisted, examined under the microscope, of broken-down epithelium-cells, and contained a large number of bacillus-germs and *bacilli*. (See drawing III, fig. 2.) The mucous membrane of the trachea and of the bronchial tubes appeared to be congested, and more or less swelled in every case.

4. The pulmonal and costal pleura, the mediastinum, and the pericardium presented almost invariably some morbid changes; only in a few cases no visible morbid changes could be found. In some animals those membranes appeared to be smooth, but either the thoracic cavity or the pericardium, usually both, contained a smaller or larger quantity (from one ounce to one pint or more) of straw-colored serum. In a great many cases one or more, and sometimes all, of those membranes were coated to some extent with plastic exudation. In several cases a more or less firm adhesion between costal and pulmonal pleura and mediastinum, between pulmonal pleura and diaphragm, or between pulmonal pleura and pericardium, had been effected. In a few cases the whole surface of the lungs appeared more or less firmly united with the walls of the thorax. In one case the whole external surface of the heart was firmly, and in another one partially, coalesced with the inner surface of the pericardium. The pig (a fine animal about four months old), in which the pericardium adhered with its whole interior surface firmly and inseparably to the external surface of the heart, had severe convulsions during life. It was killed in my presence by a professional butcher, who stuck it in the usual way and severed the trunk of the carotides; only a few drops of blood issued, but the pig died immediately. The other morbid changes consisted in hepatization in the lungs, enlargement of the lymphatic glands, and the presence of large and numerous morbid growths in the cæcum and colon.

5. In nearly every animal the heart itself has been found more or less affected in one way or another. In some animals it was flabby and dilated, but in most cases it was more or less congested. The capillary vessels, especially of the auricles, were, in a large number of cases, gorged with blood to such an extent as to give them a brownish-black appearance, almost similar to gangrene. On closer inspection, however, it could be seen very plainly that the brownish-black color was caused exclusively by an accumulation of blood in the capillary vessels.

6. In forty-eight cases out of fifty-three, characteristic morbid changes

have been found in the cæcum and colon. The same consist in peculiar morbid growths or ulcerous tumors on the mucous membrane of those intestines. They are of various sizes, nearly round or (sometimes) irregular in shape, more or less elevated above the surface of the mucous membrane, and frequently, especially the older and larger ones, dark-pigmented on their surface. Their size varies from that of a pin's head (incipient tumors or nodules) to that of a quarter of a dollar. The smaller ones are usually of an ochre color, and but slightly projecting above the surface of the mucous membrane (see photograph, Plate III), but the larger ones are of a grayish-black brown (see photograph, Plate IV), or blackish color; project considerably above the surface of the membrane, in some cases fully half an inch; have usually a slight concavity in the center, and frequently a plain neck or thick pedicle. (See photographs, Plates V, VI, and VII.) Under the microscope these morbid growths or excrescences appear to be composed, on their surface, of a granular detritus and morbid epithelium cells, and contain innumerable *bacilli suis*, some of which have a very rapid motion. (See drawing V, fig. 1.) The stroma of these morbid growths consists mainly of a dense connective tissue. In some cases these morbid growths, especially the smaller ones, or those of a recent origin (see photograph, Plate III), are situated merely on the surface of the mucous membrane, and are easily scraped off with the back of the scalpel. Thus removed they leave behind an uneven, excoriated surface, not dissimilar to granulation. The older and larger tumors, however, extend deeper into the membranes of the intestine; they usually penetrate the mucous membrane, and extend into the muscular coat, and even penetrate the latter, and extend into the external or serous membrane. In some cases all three membranes of the cæcum or colon have been found degenerated and destroyed beneath such a morbid growth, so as to show perforation on the removal of the latter. The immediate surrounding of such a deep-seated degeneration presented some, but not very much, inflammation. These morbid growths, usually, were found most developed near the ileo-cæcal valve in the cæcum, but also in larger or smaller numbers, and of various sizes, large and small, in all parts of the cæcum and colon.

7. The same, or very similar morbid growths, occurred also, though not so often, in other intestines. In one case (experimental pig No. VII) a diffuse, decaying morbid growth coated the whole interior surface of the jejunum for a length of several feet. Examined under the microscope it was found to consist of broken-down epithelium cells and a granular detritus, and contained numerous *bacilli* and bacillus-germs. (See drawing VI, fig. 1.)

In another case one ulcerous tumor was found on the mucous membrane of the gall-bladder. In three cases the same, or at least very similar morbid changes, presented themselves on the mucous membrane of the stomach. (See photograph, Plate VIII.) In a few cases some ulcerous tumors were found in the duodenum, and in one case even in the right horn of the uterus. In a few cases similar morbid changes—small, knotty, tubercle-like, yellowish, or ochre-colored excrescences of the size of a small pea—were found on the surface of the spleen. In one case similar small excrescences were also found on the external surface of the vena cava posterior. In two cases the liver was found to be degenerated by an hypertrophic condition of the connective tissue, a morbid change which may or may not constitute a product of the morbid process of swine-plague.

8. Morbid changes in the serous membranes of the abdominal cavity.

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There is a significant positive correlation between the number of children in the household and the number of children in the neighborhood. This suggests that families with more children tend to live in neighborhoods with more children, which could be due to social networks or shared resources.

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... to show particular sensitivity to the quality of the environment in which they are raised and to the development of

the following results:

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SWINE FEVER.

Report Commissioner of Agriculture for 1878.

Plate II.



A. Rosen & Co. Lith. Aust. Baltimore

Enlarged section of right lung of experimental pig. No. VII.



In some cases the peritoneum and the serous membranes of the intestines appeared to be perfectly smooth, but a larger or smaller quantity of straw-colored serum, from two ounces to one quart or more, was found in the abdominal cavity. In others, adhesions between the intestines and the peritoneum, between the intestines themselves, or with other organs, had been effected. More or less coalescence between cæcum and colon, between cæcum and ilium, or between the convolutes of the colon, sometimes not separable except by means of the knife, presented itself in almost every case, and in which the ulcerous tumors or morbid growths in the cæcum and colon were extensive, large, and sufficiently deep-seated to affect the serous membrane.

9. The contents of the gall-bladder in a large number of cases were found to consist of a semi-solid, granular, and dirty brownish-colored substance. In most of those cases, however, the ductus choledochus appeared to be thickened, and its membranes swelled; and so it may be that the semi-solid condition of the bile was due to some extent to the partially or totally obstructed passage.

10. In one case a morbid enlargement or hypertrophy of the pancreas presented itself, and slight changes (congestion) were found in a few cases in the kidneys.

11. Morbid changes, similar in every respect to those occurring on the mucous membrane of the cæcum and colon, presented themselves in two cases on the conjunctiva, or mucous membrane of the eye. But as the conjunctiva is exposed more or less to the influence of the atmosphere, the morbid growth was not projecting in the same way as in the cæcum and colon; over the surface of the membrane the decay was more complete, and, perhaps, more rapid, so that instead of an excessive growth loss of tissue could be noticed. In both cases the eyes themselves appeared congested, and the animals seemed to be perfectly blind.

12. In one case the gums of the lower jaw presented similar changes, but in these, too, considerable loss of tissue had taken place. The morbid process extended into the lower jaw-bone, and enough of it had been decayed and destroyed to expose the roots of the incisors, and to cause some of them to drop out.

13. Morbid changes, ulceration, and decay have been observed twice in one of the spermatic chords of pigs which had been castrated a short time before the disease was contracted. In both pigs an abscess was found in the scrotum, being the only instances in which real matter or pus was observed.

14. In nearly all those hogs and pigs which had been ringed to prevent them from rooting, the parts thus wounded presented more or less decay, in about a dozen cases to such an extent as to cause a formation of large holes directly from the superior surface of the nose into the nasal cavities. These holes presented very ragged or corroded borders, coated with a dirty-yellowish detritus, and were, in several instances, sufficiently large to enable the animals to breathe through instead of through the nostrils.

15. Morbid changes in the skin, but of a different character, were found to be of frequent occurrence. In three or four cases numerous small morbid growths (eruptions) extending but slightly into the cutis, but causing a complete degeneration of the epidermis, and leaving behind, if removed, an uneven, raw, or excoriated surface, in appearance not unlike granulation, were found on the comparatively fine skin on the lower surface of the body, between the legs and behind the ears. In two other cases whole pieces of degenerated and decayed skin had sloughed off and fallen out. The corroded borders and the bottom of

the ulcers thus produced were coated with a dirty-yellowish looking granular detritus.

In a great many cases, that is, in nearly half of the whole number examined, red or purple spots and patches, and even continuous or confluent redness, of a purple hue, presented themselves in the skin on the lower surface of the body, between the legs, behind the ears, &c. At the autopsy the skin and the subcutaneous tissue appeared to be congested, the capillary vessels were gorged with blood, and more or less exudation and small extravasations of blood were found to have taken place. In one case a large piece of skin on the lower surface of the body was mortified.

16. In two cases quite extensive extravasations of blood presented themselves in the mucons membrane of the stomach and intestines.

17. The blood presented some quantitative and qualitative changes in every case. Its quantity appeared to be diminished in every animal, in some cases to such an extent that not more than, say, four or five ounces could have been collected if the animal had been killed by bleeding. Still, the actual want of blood was never as great as it appeared to be, because a considerable quantity was locked up in the tissues, especially in the lungs, and had become stagnant in the capillary vessels. The blood was dark-colored in all cases in which death had been caused by extensive morbid changes in the lungs, or in which, on account of those changes, respiration had been very imperfect; but it presented a normal color, and was perhaps a little lighter colored and thinner or more watery than in a healthy hog, in all cases in which death had been caused by other morbid changes, or in which the affection of the lungs was comparatively unimportant. It invariably coagulated as soon as it became exposed to the influence of the atmosphere, to a loose and spongy clot, containing a considerable quantity of serum. Hence, it must be supposed that it was rich in fibrinogen, but probably poor in fibrin, a condition due, unquestionably, to the fact that during the disease the process of waste had been largely in excess of that of repair.

Under the microscope the blood-corpuscles of fresh blood appeared sometimes nearly all normal or round, and sometimes more or less angular and star-shaped, but after a while they all became more or less angular and of an irregular shape, and showed more or less tendency to congregate in rows and clusters. The fresh blood contained numerous bacillus-germs, many of them simple, small, round bodies, some in process of budding, others budded or double, and still others congregated into, apparently, viscous clusters. (See drawing II, fig. 1; drawing IV, fig. 4; drawing VII, figs. 1 and 4; drawings VIII, IX, and X, fig. 1.) In a few cases fully developed *bacilli suis* were found in the fresh blood, but they were, comparatively, few in number. In blood which had been kept twenty-four hours or longer in well-closed vials, *bacilli* were always more numerous, and sometimes were found in large numbers. As soon, however, as putrefaction or decomposition had set in, the *bacilli* disappeared. White blood-corpuscles, a few in number, were found only in three or four cases.

18. A microscopic examination of the blood-serum or exudations, deposited in the pulmonal tissue, invariably revealed, besides some angular red blood-corpuscles, an immense number of *bacilli suis*, and of bacillus-germs in all stages of development, single, budding, budded, or double, and congregated into clusters. (See drawing III, fig. 1, and drawing II, figs. 3 and 4.)

That every one of these morbid changes does not occur in one and the

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SWINE FEVER.

Report Commissioner of Agriculture for 1878.

Plate III.



A. Horn & Co. Lith. New York. Baltimore

Ulcerous tumors on mucous membrane of intestines



same animal, and that sometimes some and sometimes others are more developed and constitute the immediate cause of death, has already been indicated, and does not need any further explanation. To convey, however, a clearer idea of the morbid features and changes presented after death, I will copy from my notes the result of the *post-mortem* examinations of a few of my experimental pigs. Of pigs Nos. 5 and 6 the symptoms, observed during life, have already been noted.

Post-mortem examination of pig No. 5.—On opening the chest, the ribs, usually tough in a young animal, broke very easily, and seemed to be deficient in organic substances. No serum in the chest; pulmonic pleura rough, partially coated with plastic exudation; lower half of both lobes of lungs hepatized; no serum in the pericardium, but apex of heart firmly coalesced with the inner surface of the pericardium; thick, white, and frothy mucus, but no *strongili paradoxii* in trachea and bronchial tubes. Cæcum and colon firmly agglutinated to each other with their external surfaces; adhesion separable only by means of the knife. Numerous large and small ulcerous tumors or morbid growths in both cæcum and colon. (See photograph, Plate V, which shows the cæcum, and Plate VI, which shows the colon, natural size of pig No. 5.) Lymphatic and mesenteric glands enlarged. Ulcerous decay in mucous membrane of the stomach. (See photograph, Plate VIII, which presents the interior surface of the stomach of pig No. 5, natural size.) Besides those essential changes mentioned, one large nematoid was found in the ductus choledochus, extending from the duodenum through the choledochus and the gall-bladder into an hepatic duct. Another worm of the same kind was found in the cæcum.

Autopsy of pig No. 6.—An abscess in right side of the scrotum, about seven-eighths of an inch in diameter, and connected with ulceration in right spermatic chord. Inguinal and axillary lymphatic glands considerably enlarged. One-fourth of right and one-fifth of left lobe of lungs hepatized; the rest gorged with blood-serum or exudation. Cæcum and colon agglutinated to each other; cæcum also adhering to peritoneum. Mesenteric glands very much enlarged; right spermatic chord ulcerated. (Pig had been castrated a few weeks before it contracted the disease.) Extensive morbid growth, in process of decay, in cæcum, and also a large number in colon. Some exudation on lower surface of spleen. Ulcerous decay in mucous membrane of anterior portion of stomach, and wine-colored infiltration and extravasations of blood in mucous membrane of pyloric portion of same intestine.

Autopsy of pig B.—Some redness between hind legs and on lower surface of the body; greenish mucus oozing from the nose; axillary and inguinal glands very much enlarged; ribs deficient in organic substances, at any rate very brittle; both lungs spotted all over, indicating plainly capillary embolism in early stage of development; hepatization limited, just commencing; lymphatic glands in chest very much enlarged; the heart, but especially the auricles, very much congested; auricles almost black; small quantity of straw-colored serum (not exceeding two ounces) in thoracic cavity, and still less in pericardium. In the abdominal cavity mucous membrane of anterior part of stomach wine-colored; some diffuse morbid growth, in process of decay, in posterior (pyloric) portion of same membrane. No food whatever in stomach and intestines; bile thickened, semi-solid; no ulceration nor any morbid growth whatever in cæcum, colon, or any other intestine.

Results of post-mortem examination of experimental pig No. VI.—Decaying blotches or nodules of the size of a five-cent piece and smaller on skin of lower surface of body and between the legs; right spermatic

chord ulcerated, and an abscess the size of a hen's egg in right side of scrotum. Internally all lymphatic and mesenteric glands enlarged; anterior portion of both lungs everywhere, with their whole external surface, and posterior portion at some places adhering (coalesced) to the costal pleura; numerous smaller and larger embolic tubercles, presenting the appearance of incipient abscesses, in anterior portion of both lobes of the lungs, but more numerous and more developed in right lobe than in the left; remainder—posterior parts of both lobes—gorged with exudation; small quantity of straw-colored serum in the chest and in the pericardium. In abdominal cavity, liver rather hard (sclerotic), its connective tissue apparently hypertrophied. One small tape-worm, not over one and a half inches long, in jejunum, and numerous small, incipient morbid growths or ocher-colored decaying nodules in cæcum. (See photograph, Plate III.) No other morbid changes.

Besides these numerous morbid changes, which must be looked upon as products of the morbid process of swine-plague, some species of entozoa, a few of which have already been mentioned, have occasionally been met with; but as their presence is merely accidental, that is, has nothing whatever to do with the disease in question, a brief mention of this occurrence will be sufficient. *Strongilus paradoxus* has been found in small numbers in the bronchial tubes of a few pigs in one herd only—Mr. Basset's. *Trichocephalus crenatus* has been found in small numbers in the blind end of the cæcum of four animals, belonging to two different herds. A small tape-worm was once found in the jejunum, as has been stated, and a few other entozoa (nematoids) were found in four or five instances in the choledochus, gall-bladder, and hepatic ducts (in one case as many as twelve worms), and twice in other intestines.

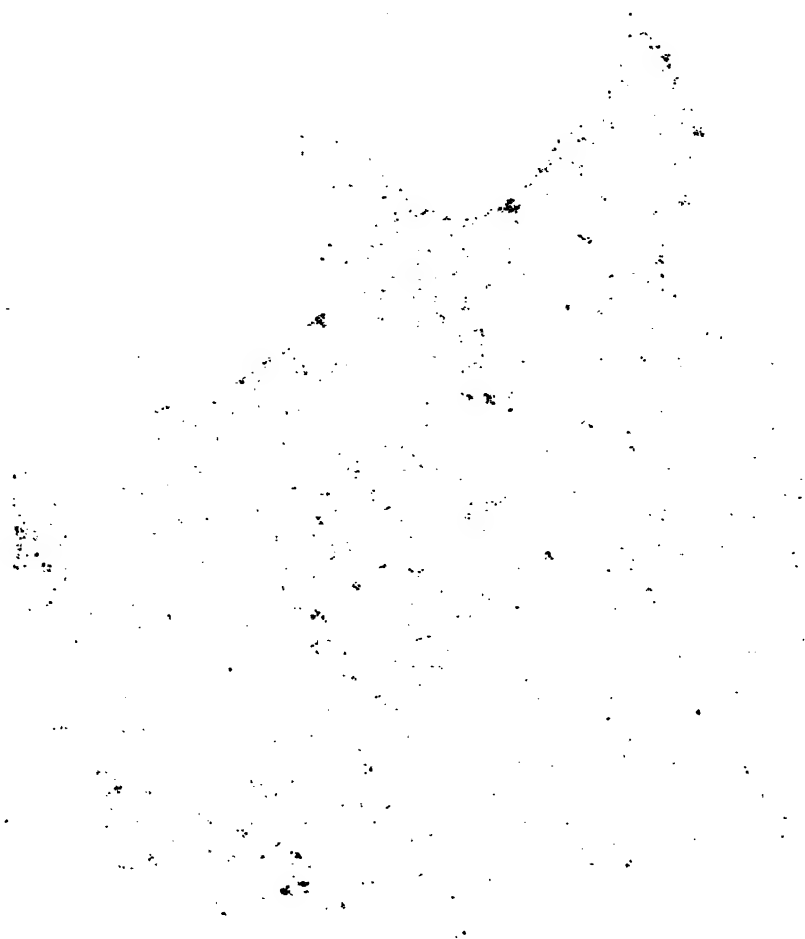
What I have so far related was comparatively easily ascertained. Numerous examinations of diseased animals, frequent visits to affected herds, and fifty-three *post-mortem* examinations revealed the facts, and all that was necessary was to observe and take notes. But the principal object of the investigation was to devise means to prevent the immense losses caused every year by that most fatal disease, swine-plague. (I have adopted that name, because the disease, if anything, is a real plague; and the name is sufficiently comprehensive to cover the whole morbid process, and so simple that I have no doubt it will soon supercede, even among farmers, that very improper name of hog cholera.)

To devise such means, a more reliable basis than a mere knowledge of the various features of the disease had to be gained. The real nature of the morbid process, and the true cause or causes, had to be ascertained. Above all, it had to be decided as to whether swine-plague is a contagious disease or not; and if contagious, the means by which the contagion is conveyed from one place and from one animal to another; the manner in which it enters the animal organism, and, if possible, the nature of the same. This could not be done by simply visiting diseased herds and examining sick and dead animals; it was necessary to make experiments and to observe and to record the results. This I have done, and before I proceed any further it may be best to give, first, a condensed account of the experiments which I have made for the purpose of settling those points, so as to give others an opportunity to form an opinion as to the correctness of the conclusions I have arrived at. I will mention again, that in making those experiments, in noting the results, and in making the necessary and very numerous microscopical examinations, I have been ably assisted by my friends, Dr. F. W. Prentice and Prof. T. J. Burrill, of the Illinois Industrial University. I commenced those experiments after I had gained con-

SWINE FEATHER

Report Commissioned by the Senate of the U.S.

1911



SWINE FEVER.

Report Commissioner of Agriculture for 1878.

Plate IV.



Allen & Co. Litho. Baltimore

Ulcerous tumors on mucous membrane of intestines, projecting above surface



siderable information as to the various features of the disease during life and after death, and as to the conditions and surroundings under which the same makes its appearance. The first series of experiments has been made for the purpose of settling the question as to the contagiousness or non-contagiousness of Swine-Plague. This was the more necessary from the fact that those who had suffered severe losses were decidedly divided on that question.

FIRST SERIES OF EXPERIMENTS.

After encountering considerable difficulty in finding indubitably healthy pigs, belonging to a perfectly healthy herd, which had never been in contact with diseased animals, I succeeded finally, on the 20th of August, in buying of Mr. Harris, south of Champaign, three Berkshire sow pigs about three and a half months old, perfectly healthy, and without any lesions whatever. I designated them as pigs Nos. 1, 2, and 3. Dr. Prentice, at the same time, had the kindness of placing at my disposition two box-stalls in his veterinary hospital, a new building which had never been entered by any hog or pig. About one hundred and fifty yards east of the veterinary hospital building, on a piece of ground never trodden by hogs, as far as known, I built of new lumber a pen eight feet square. This pen I designated pen No. 1, and the box-stalls, which are twelve feet square, as pens Nos. 2 and 3 respectively. Pig No. 1 was put in pen No. 1, and pigs Nos. 2 and 3 together in pen No. 2.

It may be well to state here that pen No. 1 having no floor, but resting on the ground, was moved to another place (each time its own width) every other day, usually at noon, in order to preserve cleanliness, and pens Nos. 2 and 3 were cleaned and swept once a day, except where stated otherwise in the following pages. The food of all experimental pigs was the same, and consisted of corn in the ear, and occasionally a little green clover and purslane at noon or in the evening. The water for drinking was drawn three times a day from a well.

1. *Account of pig No. 1.*—On August 21 I procured from Mr. Bassett, four miles north of Champaign, a diseased Chester white pig, four months old (pig No. 4), which I put with pig No. 1 in pen No. 1. This diseased pig which arrived at 10.30 o'clock, a. m., exhibited plain and unmistakable symptoms of swine-plague: its temperature was $106\frac{1}{2}^{\circ}$ F., and its skin, on lower surface of the body, between the legs, &c., was considerably reddened. The temperature of pig No. 1, which objected to being examined and struggled hard, was $104\frac{1}{2}^{\circ}$ F.

August 22.—Pig No. 1 all right; has vigorous appetite. Pig No. 4 at 8 o'clock a. m. very sick; has a peculiar, short, abrupt cough; at 1 o'clock, p. m., dead.

Post-mortem examination.—Capillary redness in the skin on lower surface of body and between the legs; considerable enlargement of lymphatic glands; more than two-thirds of the lungs hepatized and gorged with blood-serum; some straw-colored serum in thoracic cavity and pericardium; and morbid growths in process of decay (ulcerous tumors), in cæcum and colon.

Received at 1 o'clock, p. m., three more pigs, each about three months old (cross of Berkshire and scrub), of Mr. Schumacher, a butcher in Champaign, who had bought the same of a farmer ten miles southeast of Champaign. I designated the same as pigs Nos. 5, 6, and 7. Pigs Nos. 5 and 6 appeared to be perfectly healthy, and were put together in pen No. 3. Pig No. 7 was apparently indisposed; it had been transported ten miles, crowded together with twenty others, most of them

larger and older, and exposed for several hours to the burning rays of the sun, in an open farm-wagon on a very hot day. It was panting for breath, and showed symptoms of congestion of the lungs. It was put in pen No. 1 with pig No. 1, before dead pig No. 4 had been removed.

August 23.—Pig No. 1 perfectly healthy. Pig No. 7 very sick; breathes ninety-two times per minute; shows plain symptoms of pleurites; has no appetite, but is attentive and moves quickly when disturbed. It died at 8 o'clock p. m. *Post-mortem* examination revealed pleurites and pericarditis; the whole surface of the lungs was loosely agglutinated to costal pleura, and the substance of the same was gorged with exudation. *No other morbid changes whatever.* Whether this was a case of swine-plague or not, I leave to my readers to decide for themselves. I am decidedly of the opinion it was not, because none of the other twenty pigs, except Nos. 5 and 6 (see account of them) have, up to date, contracted the disease, as I have learned from a reliable source. It is true two other pigs of the same lot showed some indisposition on the 24th, 25th, and 26th days of August, but were all right again the next day, and are healthy yet.

August 24.—Pig No. 1 perfectly healthy; vigorous appetite.

August 25.—No change.

August 26.—No change.

August 27.—No change.

August 28.—Weather very hot and sultry; in afternoon severe thunder-storm and rain, which effected a sudden cooling of the atmosphere. Pig No. 1 in perfect health.

August 29.—Pig No. 1 coughed once; being exposed in an open pen to the changes of weather and temperature, it has possibly taken cold.

August 30.—Pig No. 1 perfectly healthy; is very lively, and has vigorous appetite.

August 31.—The same.

September 1.—The same.

September 2.—The same.

September 3.—The same.

September 4.—The same. At 6.30 o'clock, p. m., diseased experimental pig No. 2 (see account of the same further down) was put in pen No. 1 with pig No. 1.

September 5.—Pig No. 1 perfectly healthy. Pig No. 2 eats nothing; shows plain symptoms of pneumonia.

September 6.—Pig No. 1 perfectly healthy. Pig No. 2 died at 6 o'clock, p. m. (For *post-mortem* examination, which was made immediately, see account of pig No. 2.)

September 7.—Pig No. 1 perfectly healthy, and has remained so up to date. Has always first-rate appetite, has never refused a meal, and is to-day a strong, vigorous, and thriving pig. (Made use of the same for another experiment on November 13.)

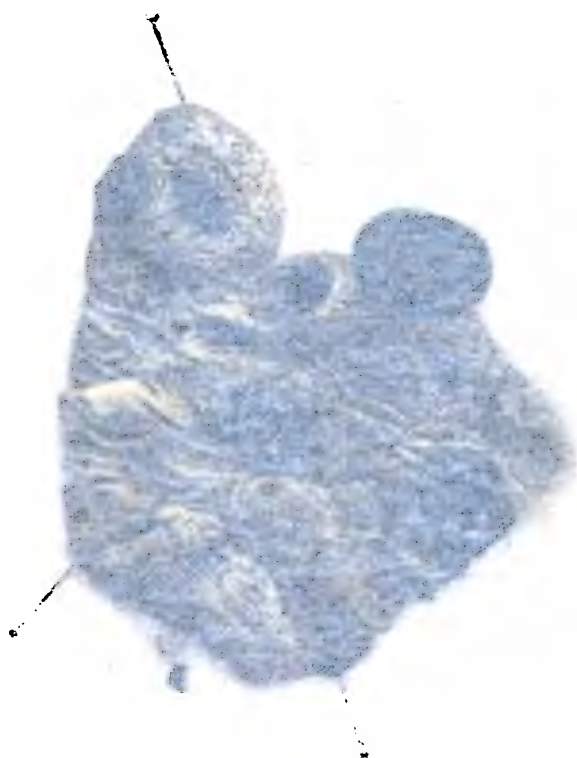
2. *Account of pigs Nos. 2 and 3.*—*August 21.*—Both pigs are perfectly healthy; have good appetite, and are active and lively.

August 22.—Both pigs perfectly healthy. Inoculated both in right ear at 1.30 o'clock, p. m., with blood-serum from the lungs of pig No. 4, which had died at 1 o'clock, p. m. The operation was performed by means of a small inoculation-needle, made for the purpose of inoculating sheep with the virus of sheep pox. Each pig received two slight punctures on the external surface of the ear; the serum inoculated was less than one-fourth of a drop per animal. The blood-serum used was of a faint reddish color, and almost limpid. Examined under the

SWINE FEVER.

Report Commissioner of Agriculture for 1878

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Microscopic view of the membrane of intestines showing the

larger and older, and exposed for several hours to the burning rays of the sun, in an open ~~farm wagon~~ on a very hot day. It was panting for

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SWINE FEVER.

Report Commissioner of Agriculture for 1878.

Plate V.



A. E. Egan & Co. Lithographers Baltimore.

Ulcerous tumors on mucous membrane of intestines, showing concavity in center.



microscope it contained a few red blood-corpuscles, numerous bacillus-germs, and some developed *bacilli suis*.

August 23.—Pigs Nos. 2 and 3 perfectly healthy. No visible reaction.

August 24.—Both pigs perfectly healthy; have very good appetite.

August 25.—No change.

August 26.—No change.

August 27.—Pig No. 2 appears to be slightly indisposed. Pig No. 3 apparently healthy.

August 28.—Both seem to be healthy; eat well.

August 29.—Pig No. 2 not quite as lively as a healthy pig; does not seem to have very good appetite. Pig No. 3 shows no symptoms of disease. Temperature of pig No. 2, 105.4° F., and of No. 3, 104.1° F. Both pigs struggled very much while being examined.

August 30.—Pig No. 2 not very lively, and shows a tendency to lie down; does not eat as well as formerly; temperature, 104.1° F. At feeding time in the evening it did not arise, nor did it seem to care for its food. Pig No. 3 apparently all right.

August 31.—Pig No. 2 shows plain symptoms of sickness; arches its back, and moves with short undecided steps. Pig No. 3 appears to be less lively.

September 1.—Both pigs, Nos. 2 and 3, show plain symptoms of swine-plague.

September 2.—Pig No. 3 seems to be worse than pig No. 2. In afternoon the eyes of pig No. 3 appeared congested, and the conjunctiva infiltrated with blood. Appetite of both animals rather poor. Both are thirsty.

September 3.—Pigs Nos. 2 and 3 do not eat anything; are evidently very sick; show great indifference to surroundings, and do not like to come out of their corner. Both are very weak, and look as if they suffer from pressure upon the brain.

September 4.—Pigs Nos. 2 and 3 have not touched any food; they huddle together in their corner, lie down, and will not get up unless compelled to do so. Both show increasing muscular weakness and emaciation. At 6.30 o'clock, p. m., pig No. 2 was removed to pen No. 1. (See account of pig No. 1.)

September 5.—Pig No. 2 (now in pen No. 1) eats nothing; has plain symptoms of pneumonia. Pig No. 3 (in pen No. 2) is getting very weak; at 7 o'clock, p. m., is lying flat, and in a dying condition.

September 6.—Pig No. 2 (in pen No. 1) very sick. Pig No. 3 (in pen No. 2) dead in the morning, with well-marked *rigor mortis*.

Post-mortem examination.—Skin normal; lymphatic glands enlarged; left lobe of lungs partially hepatized; right lobe the same, but hepatization more extensive; no serum in thoracic cavity; about two drachms in pericardium; heart normal; spleen enlarged; partially coalesced with peritoneum of abdominal wall, which shows traces of inflammation; some small ulcerous tumors on surface of spleen, and adhesion between the latter and the colon; mesenteric glands considerably enlarged; morbid growths or ulcerous tumors, and a few worms (*trichocephalus crenatus*), the latter partially embedded in the smaller cæcal mucous membrane in cæcum; blood extravasations, and capillary congestion in mucous membrane of cæcum, colon, ilium, and stomach; liver somewhat enlarged; kidneys normal. The blood, examined under the microscope, contained, besides red blood-corpuscles with ragged, irregular or star-shaped outlines, a few white blood-corpuscles (from one to five in the field), numerous bacillus-germs in various stages of development, and a few developed *bacilli suis*.

Pig No. 2 died at 6 o'clock, p. m. (See account of pig No. 1.)

Post-mortem examination.—Skin normal; lungs partially hepatized; hepatization most marked in anterior lobes; small quantity of serum in pericardium; liver enlarged; one nematoid in choledochus; abdominal cavity free from serum; ecchymosis on the external surface of colon and cæcum; capillary hyperæmia and swelling in cæcal mucous membrane; several small ulcerous tumors in cæcum, especially near the ilio-cæcal valve; swelling, capillary congestion, and extravasations of blood in mucous membrane of colon and ilium; kidneys normal; bladder empty; mucous membrane of stomach similar in appearance to that of cæcum, colon, and ilium.

Account of pigs Nos. 5 and 6.—Pigs Nos. 5 and 6, which arrived, as has been stated before, August 22, at 1 o'clock, p. m., were put in pen No. 3, and at 1.30 o'clock, p. m., the colon, the heart, and a piece of the diseased lungs of pig No. 4 were given to them. They, however, touched neither colon, heart, nor piece of lung.

August 23.—Both pigs, Nos. 5 and 6, in good health, and eat their food greedily, but have not touched the colon, heart, and piece of lung. The colon, having become very putrid, had to be removed; heart and piece of lung were thrown into the feed-trough.

August 24.—Both pigs healthy. Heart and piece of lung have disappeared, but whether they have been consumed by the pigs or by rats I am not able to decide.

August 25.—Both pigs healthy; have good appetite, and eat greedily.

August 26.—The same.

August 27.—The same.

August 28.—The same. August 28th was a very hot day, but a severe thunder-storm in the afternoon effected a sudden cooling of the atmosphere.

August 29.—Both pigs, Nos. 5 and 6, seem to have a slight catarrh, probably in consequence of the sudden reduction of temperature and change of weather. Both cough some.

August 30.—Both pigs, to all appearances, all right, except that occasionally a slight cough can be heard. Both have first-rate appetites.

August 31.—Both pigs apparently in perfect health; appetite good.

September 1.—Both pigs all right.

September 2.—The same.

September 3.—The same. Pig No. 5 coughed once or twice, but has excellent appetite.

September 4.—Pig No. 5 coughs again a few times, but is lively, and has very good appetite. No. 6 is all right in every respect.

September 5.—Both pigs all right.

September 6.—Both pigs have good appetite, are very lively, and seem to enjoy good health. At 10.30 o'clock, a. m., the entire stomach, cut up into five pieces, the cæcum, and the spleen of pig No. 3 were given to them, and consumed immediately in the presence of Dr. Prentice.

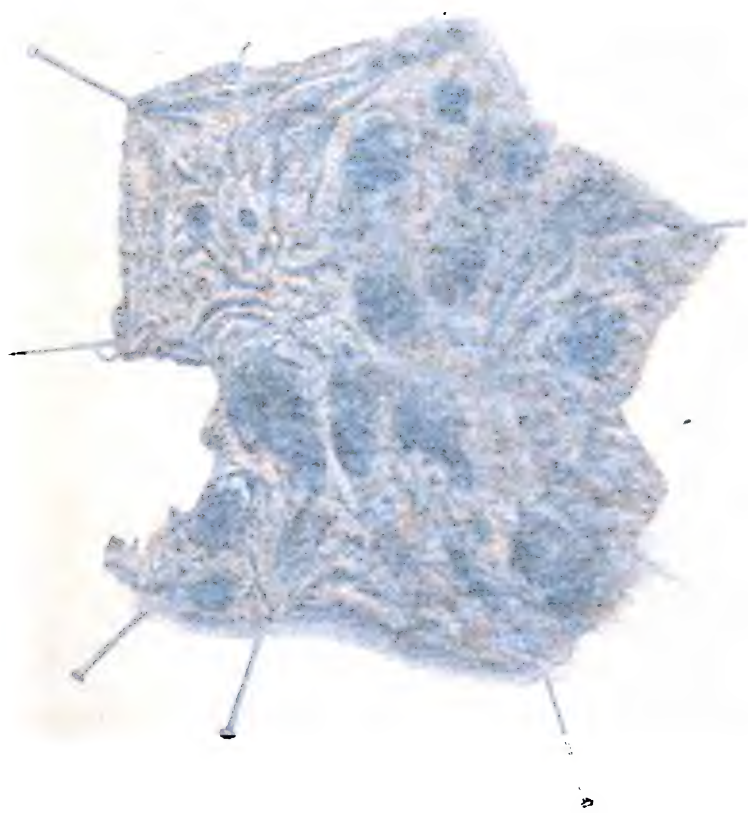
September 7.—Both pigs, Nos. 5 and 6, have very good appetite. No. 5 has a slight cough, and a slight accumulation of mucus in the inner canthi of the eyes. (For further particulars see the accounts given of pigs Nos. 5 and 6 in the chapter on Symptoms and Morbid Changes.)

Having thus ascertained by experiments, just related, that swine-plague is infectious, and can be communicated by inoculation, and also through the digestive canal by a consumption of morbid tissues, I considered it to be of great importance to ascertain, if possible, the nature of the infectious principle; that is, to decide by experiments whether it consists in something corporeal, endowed with life and power of propa-

SWINE FEVER.

Report Commissioner of Agriculture for 1878.

Plate VI.



Ulcerous mass on mucous membrane of the stomach of a pig, showing the characteristic changes.

SWINE FEVER.

Report Commissioner of Agriculture for 1878.

Plate VI.



A. Boon & Co. Lithographers Baltimore

Ulcerous tumors on mucous membrane of intestines, showing different view.



gation, or in some invisible chemical agency or mysterious fluid permeating, as has been supposed, the whole animal organism, and contained in, or clinging to, all those substances which possess infectious properties, or constitute the bearers or vehicles of the contagion. As all microscopical examinations of the blood, morbid tissues, and morbid products of forty-two animals, which had been affected with swine-plague and had died of that disease or been killed by bleeding, and repeated microscopical examinations of the excretions (urine and excrements) of diseased animals, have revealed in every case the presence of numerous bacillus-germs (micrococci of Hallier) and developed *bacilli suis*, I deemed it necessary to ascertain first, if possible, the relation which these extremely small microscopic bodies may have to the morbid process and to the infectious principle. For that purpose I commenced another series of experiments, and bought again, on September 24th, three very nice, perfectly healthy pigs, each a little over three months old, of Mr. Burton, residing four miles southeast of Champaign. I designated one of them, a nearly full-bred Berkshire barrow, as pig A; another one, a Poland-China sow, as pig B; and the third one, also a Poland-China sow, as pig C.

Account of pigs A, B, and C.—The same arrived at 10 o'clock, a. m. Pig A was put in pen No. 1 with pig No. 1; pig B in pen No. 3 with pig No. 6; and pig C by itself in the thoroughly cleaned and disinfected pen No. 2, formerly occupied by pigs Nos. 2 and 3. Pen No. 2 had been clean and empty since September 6th, and was again disinfected with carbolic acid before pig C was put in.

September 25.—All three pigs, A, B, and C, perfectly healthy.

September 26.—All three pigs perfectly healthy; have good appetite.

September 27.—The same; inoculated pig C with cultivated *bacilli* and bacillus-germs. On September 23d, Professor Burrill charged two drachms of fresh cow-milk with a mere speck, smaller than a pin's head, of a decaying morbid growth, or ulcerous tumor of the cæcum of pig No. 5, and kept the vial well closed, at a temperature of 92° F. On the evening of September 26th the milk was examined under the microscope, and was found to contain numerous *bacilli suis* and bacillus-germs (see drawing III, figs. 3 and 4), the same as found in the blood-serum, or exudation of diseased lungs, and in the decaying substance of the intestinal morbid growths. The inoculation with this milk was executed in the same way as the inoculations of pigs Nos. 2 and 3; two punctures were made on the external surface of the left ear.

September 28.—All three pigs perfectly healthy. The inoculation-punctures on the ear of C slightly swelled.

September 29.—Pigs A, B, and C, all right.

September 30.—All three pigs perfectly healthy; no symptoms of disease.

October 1.—The same.

October 2.—Pig A perfectly healthy; pig B shows symptoms of sickness, sneezes, has eruption on the ears, diminished appetite, and is not as lively as formerly. As a full account of pig B has already been given in the chapter on symptoms and morbid changes, it will not be necessary to repeat what has been said there, and pig B may be dropped. Pig C apparently all right in the morning. At noon, pig C, too, commences to sneeze; sneezes a good deal, and shivers like a man suffering from ague, but has good appetite.

October 3.—Pig A perfectly healthy. Pig C shows slightly diminished appetite and other plain symptoms of indisposition; is less lively, and has a tendency to lie down; the sneezing continues.

October 4.—Pig A in first-rate health. Pig C a little more lively; has fair appetite, but is not as greedy as formerly.

October 5.—Pig A in fine condition, and all right in every respect. Pig C shivers, and sneezes again a good deal, but does not show any other perceptible symptoms of disease, except some eruptions behind the ears, and on the external surface of the same.

October 6.—Pig A all right in every respect. Pig C about the same as preceding day.

October 7.—Pig A perfectly healthy. Pig C has good appetite, and with the exception of its coat of hair being a little rougher than usual, does not show any plain symptoms of disease.

Made two *post-mortem* examinations of pigs which had died of swine-plague at Mr. Hossack's place, five miles southwest of Champaign. In the evening I examined microscopically the blood-serum or exudations of the diseased lungs of one of Mr. Hossack's pigs, and found normal red blood-corpuscles, numerous bacillus-germs in all stages of development—single, budding, budded, or double, and aggregated into clusters—and some developed *bacilli suis*.

October 8.—Pig A all right. Pig C shivering again. In the forenoon I filtered some of the blood-serum of the diseased lungs of Mr. Hossack's pig through eight filters—the very finest used in chemical laboratory of the I. I. University—for the purpose of freeing the serum from the *bacilli* and bacillus-germs; but notwithstanding that I have taken all possible precautions, the filtrate, which was almost limpid, still contained, as examined under the microscope, a great many bacillus-germs. I preserved it in a vial with a tight-fitting ground-glass stop.

October 9.—Pig A healthy. Pig C has fair appetite, but is not greedy. I filtrated the filtrate once more through two filters, and obtained a limpid fluid, which, however, at a microscopic examination, was found to still contain some bacillus-germs. Preserved the filtrate again in a clean vial, with a perfectly-fitting ground-glass stop.

October 10.—Pig A healthy. Pig C eats its food, but is rather slow at it.

October 11.—Pig A healthy. Pig C about the same as on preceding day.

October 12.—Pig A healthy; pig C, no perceptible change.

October 13.—Pig A all right in every respect; pig C does not show any plain symptoms of disease in the morning, but is sneezing again in the evening.

October 14.—Pig A in perfect health; pig C sneezes a good deal, but has fair appetite. Took up again the filtrated blood-serum, and finding, on examination under the microscope, that the bacillus-germs had changed to *bacilli* (see drawing XI, figs. 1 and 2), I filtrated the same again through four papers. Dr. Prentice and myself examined the filtrate obtained under the microscope (850 diameters), and neither of us being able to discover any bacillus-germs, I inoculated pig A on the left ear with the filtrate in the same manner in which the other pigs had been inoculated. Made two punctures, but used a needle a trifle larger than the one used before.

October 15.—Pig A all right; no reaction whatever. Pig C sneezing, but fair appetite.

October 16.—Pig A perfectly healthy, and has remained so up to date (November 11th). It has never refused a meal, and has been always very active and lively. It is now a very fine pig and in a first-rate condition. (Made use of the same for another experiment on November 13th.) Pig

SWINE FEVER.

Report Commissioner of Agriculture for 1878.

Plate VII.



U. S. GOVERNMENT PRINTING OFFICE: 1879.

October 4.—Pig A in first-rate health. Pig C a little more lively; has fair appetite, but is not as greedy as formerly.

October 5.—Pig A in fine condition, and all right in every respect.

Pig B in fine condition.

Pig C in fine condition, and all right in every respect.

Pig D in fine condition.

Pig E in fine condition, and all right in every respect.

Pig F in fine condition, and all right in every respect.

Pig G in fine condition, and all right in every respect.

Pig H in fine condition, and all right in every respect.

Pig I in fine condition.

Pig J in fine condition.

Pig K in fine condition, and all right in every respect.

Pig L in fine condition.

Pig M in fine condition.

Pig N in fine condition.

Pig O in fine condition.

Pig P in fine condition.

Pig Q in fine condition.

Pig R in fine condition.

Pig S in fine condition.

Pig T in fine condition.

Pig U in fine condition.

Pig V in fine condition.

Pig W in fine condition.

Pig X in fine condition.

Pig Y in fine condition.

Pig Z in fine condition.

Pig AA in fine condition.

Pig AB in fine condition.

Pig AC in fine condition.

Pig AD in fine condition.

Pig AE in fine condition.

Pig AF in fine condition.

Pig AG in fine condition.

Pig AH in fine condition.

Pig AI in fine condition.

Pig AJ in fine condition.

Pig AK in fine condition.

Pig AL in fine condition.

Pig AM in fine condition.

Pig AN in fine condition.

Pig AO in fine condition.

Pig AP in fine condition.

Pig AQ in fine condition.

Pig AR in fine condition.

Pig AS in fine condition.

Pig AT in fine condition.

Pig AU in fine condition.

SWINE FEVER.

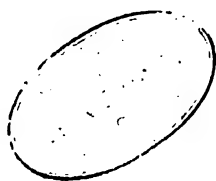
Report Commissioner of Agriculture for 1878.

Plate VII.



Albion & Co. Lithographers Baltimore.

Ulcerous tumors on mucous membrane of intestines, showing different view.



C shows plain symptoms of disease; its appetite is poor, and some emaciation has gradually taken place; at least C has not improved like A, and weighs about half as much as the latter, notwithstanding A is in an open pen, exposed to the inclemencies of the weather, and C in a good, new building, with a shingled roof, in which it is amply protected against the changes of the weather.

October 17.—Pig C rather poor appetite; breathing a little accelerated, and coat of hair somewhat rough and staring.

October 18.—Pig C exhibits plain symptoms of swine-plague; its breathing is accelerated; it sneezes a good deal, and its appetite is poor. Eats some in the evening.

October 19.—Pig C improving; has better appetite.

October 20.—Pig C much improved; eats its food again, but is not greedy.

October 21.—No change.

October 22.—Pig C is lively again, and eats well—at any rate, seems to care more for its food. The sores on the ears are healing and disappearing.

October 23.—Pig C must be considered as fully recovered from its slight attack.

Up to date pig C has presented the appearance of a perfectly healthy pig. Its ears have healed, and are now (November 11th) perfectly smooth. It is lively and greedy for its food, but has grown very little, and weighs to-day about half as much as pig A. It can be seen very plainly that pig C has been sick. When I received A, B, and C, A was slightly the best pig. B came next, and C was the smallest, but the difference was only a trifling one.

The experiments just related show that the *bacilli* and their germs must have a causal connection with the morbid process of swine-plague, because an inoculation with *bacilli* and bacillus-germs, cultivated in such an innocent and harmless fluid as milk, produced the disease, while an inoculation with blood-serum from diseased lungs—a highly infectious fluid, if not deprived of its *bacilli* and bacillus-germs—remained without the slightest effect after it had been freed from its *bacilli* and bacillus-germs. I know very well that the result obtained can hardly be considered as conclusive, and that some more experiments of the same kind are needed to confirm the conclusions arrived at.

5. THE CONTAGION, THE CAUSES, AND THE NATURE OF THE MORBID PROCESS.

That swine-plague is an infectious disease, which can be communicated to healthy animals, has been demonstrated by my experiments. It has further been proven that an exceedingly small quantity of an infectious or contagious substance (blood-serum or exudation, for instance) if inoculated, or directly absorbed by the vascular system, is sufficient to produce the disease. It has also been proven that morbid tissues and morbid products, if consumed by healthy pigs, will cause them to become affected with the plague. Consequently, two ways of infection have been ascertained with certainty. Further, if the results of the *post-mortem* examinations are inquired into more closely, it will be found that the principal morbid changes have occurred in the digestive canal, but especially in the cæcum and colon, in all those cases in which the disease had been communicated by way of the digestive apparatus; and that, on the other hand, the principal seat of the morbid process has been in the organs of respiration and circulation, or in the

organs situated in the thorax if the contagion had been inoculated or been introduced into the system through wounds and absorbed by the veins and lymphatics.

Whether an inhalation of the contagious or infectious principle into the respiratory passage or into the lungs is sufficient to produce the disease is doubtful. One pig (pig No. 1), an animal free from any lesions or wounds whatever, has been exposed twice and has not contracted the disease; but while exposed and immediately after its pen was moved once a day, and as the pen was thus kept clean, and as dry earth is a good disinfectant, it must be supposed that the animal was never obliged to consume the contagious principle clinging to the excrements of the diseased animals, neither with its food nor with its water for drinking. Its trough was cleaned three times a day, and always before fresh water was poured in. Pig B, however, was exposed only once, by being kept together with pig No. 6, and contracted the disease in due time. But the conditions were entirely different. Pen No. 3, in which both pigs were kept, contains a wooden floor; pig B was put in soon after pig No. 5 had died, and the pen, otherwise always cleaned once a day, had been left dirty (uncleaned) on purpose. So it happened that the ears of corn, thrown on the floor for food, became soiled, though perhaps only slightly, with the dung and the urine of dead pig No. 5 and diseased pig No. 6. Further, both pigs (B and No. 6) tramped through the excrements and soiled their feet, and, as pigs will do, went with their dirty feet into the trough which contained the water for drinking. So it is but fair to suppose that pig B contracted the disease, not by inhaling the contagion, but by consuming the same with its food and water for drinking. Hence I have come to the conclusion that swine-plague is probably not communicated through the lungs by an inhalation of the atmosphere surrounding diseased animals or by simple contact, but that, in order to effect a communication of the disease, the contagion or infectious principle must be introduced directly into a wound within the reach of the veins and lymphatics or be taken up by the digestive apparatus. This conclusion of mine has been corroborated by several facts, some of which I had an opportunity to observe myself, and some of which have been related to me by reliable persons. To mention a few will suffice: Mr. Henry Yothy, who lives four miles north of Urbana, informed me that his neighbor, Mr. Stickgrath, who lives only one hundred yards south of him, lost every hog but one on his place; that he, Yothy, had nineteen head of swine shut up in a yard, and has not lost a single animal, notwithstanding Stickgrath's diseased animals have been running at large, have tramped all around Yothy's pens, and come every day close to the fence; but that his, Yothy's, hogs have no lesions or wounds whatever, and having remained separated from Stickgrath's hogs by a fence, had no opportunity to consume food or water soiled with the excrements or urine of the latter, and to become infected in that way.

Mr. L. Harris, a few miles north of Champaign, kept his shoats and pigs separate from his older hogs. Among the former, swine plague made its appearance, and proved to be very fatal. They were kept in a yard west of the house, and had access to a pasture to the west and an orchard to the south. The peculiar, offensive smell emanating from that yard was so marked that I perceived it several times very plainly when passing by, at a distance of half a mile or more, so it is to be supposed that considerable contagion must have been floating in the air. The yard in which Mr. Harris kept his old hogs (they were intended to be fattened and were not allowed to run out into a pasture) was not over fifty yards south or southeast of the yard occupied by the diseased and dying shoats.

SWINE FEVER.

Report Commissioner of Agriculture for 1878.

Plate VIII.



U.S. GOVERNMENT PRINTING OFFICE: 1879.

SWINE FEVER.

Report Commissioner of Agriculture for 1878.

Plate VIII.



A. Allen & Co. Lithomasters, Baltimore.

Ulcerous tumors on mucous membrane of the stomach.



and pigs, consequently the wind, usually in the south, carried the effluvia and the foul atmosphere of the former almost constantly into the yard occupied by the old hogs. The latter, notwithstanding, remained exempted. It may yet be stated that the old hogs were fed exclusively with corn, and received nothing but well-water for drinking. On the other hand, I have not been able to learn of any herd remaining exempted after the disease had once made its appearance in the immediate neighborhood, unless the animals constituting the herd were free from any external lesions, were watered from a well, fed with clean food, and shut up during the night and in the morning till the dew had disappeared from the grass, in a bare yard not containing any old straw-stacks, or in sties or in pens. Animals allowed to run out on a pasture or on grass, clover, or stubble fields at all times of the day, and animals that had external sores or wounds, contracted the disease sooner or later in every instance where the plague made its appearance in the neighborhood. Further, the plague, at least during the summer or while south wind was prevailing, seemed to have a special tendency to spread from south to north. If the history of swine-plague is inquired into it will probably be found that that tendency has been prevailing every year. This year, for instance, the disease made its appearance, as I have been informed, for the first time, in Wisconsin. These facts, of course, could not fail to be suggestive. So I conceived the idea that the contagious or infectious principle, abundant in the excretions of the diseased animals, might rise in the air in daytime, be carried off a certain distance by winds, and come down again during the night with the dew. That such might be the case appeared to be possible, because the excrements of hogs, if exposed to the influence of sunlight, heat, rain, and wind, are soon ground to powder (partially at least), which is fine enough to be raised into the air and to be carried off by winds. Moreover, as the bacillus-germs, which, I have no doubt, must be looked upon as the infectious principle, are so exceedingly small, it appears to be possible and even probable that they are carried up into the air by the aqueous vapors arising from evaporating urine and moisture contained in the excrements, and from other evaporating fluids (small pools of water), which may have become polluted with the excretions of sick hogs. To ascertain the facts, I collected dew from the herbage of a hog-lot occupied by diseased animals, and also from the grass of an adjoining pasture, and on examining the same under the microscope I found the identical *bacilli* and *bacillus*-germs invariably found in the blood, other fluids, and morbid tissues of swine affected with the plague. (See drawing VII, fig. 5.) Consequently I have come to the conclusion that the bacillus-germs rise into the air during the day, are carried from one place to another by the wind, and are introduced into the organism of the animal either by eating herbage (grass, clover, &c.), or old straw covered with dew, or by entering wounds and being absorbed by the veins and lymphatics. There is, however, still another way by which the contagious or infectious principle is conveyed from one place to another. It is by means of running water. It has been observed that wherever swine-plague prevailed among hogs that had access to running water (as small creeks, streamlets, &c.), that all the hogs and pigs which had access to the creek or streamlet below contracted the disease, usually within a short time, while all the animals which had access above remained exempted, unless they became infected by other means. I could cite a large number of instances, but as this observation has been made everywhere, probably nobody who is at all acquainted with swine-plague will ask for any further proof.

As to the distance which the infectious principle can be conveyed through the air, I cannot make any accurate statements, but have reasons to believe that swine located a distance of one mile from any diseased herd will be safe. To decide this point, which is of very great importance, requires careful experiments.

The nature of the infectious or contagious principle.—The experiments with pigs A and C, though not conclusive and needing repetition, indicate very strongly, as has already been mentioned, that the *bacilli* and their germs formed invariably in the blood, in the morbidly changed tissues, and in the excretions of the diseased swine, must constitute the infectious or contagious principle of swine-plague. I, for my part, am convinced that such is the case. Still I should hesitate to express this opinion if it was supported only by those experiments and not by other facts, such as the peculiarities in the spreading of the disease, the manner in which the infectious principle is acting and is communicated to healthy animals, and the workings of the morbid process. (See next chapter.) At any rate, if the *bacilli* and bacillus-germs constitute the infectious principle, all the strange features of swine-plague find a satisfactory explanation; but if the infectious principle consists in an unknown and mysterious chemical something, the peculiarities of the disease are, to say the least, enveloped in mystery and cannot be explained. What Professor Beale calls bioplasm could not be discovered under the microscope.

In want of a better name I have called the *bacilli* "*bacilli suis*," because the same, as far as I have been able to learn, are peculiar to and characteristic of swine-plague. The bacillus-germs are small round bodies of—as near as I can figure without the aid of a micrometer—about 0.0007 millimeter diameter, and reflect the light very strongly. The *bacilli suis* are small, almost straight, cylindrical bodies of about 0.003 to 0.005 millimeter in length, and 0.0007 to 0.0008 millimeter in thickness, sometimes moving and sometimes without motion, and in certain stages of development slightly moniliform, but in others apparently not. (See drawings.)

The causes.—Whether the disease is caused exclusively by infection—by the *bacilli* and their germs being conveyed directly or indirectly from diseased animals to healthy ones—or whether those *bacilli suis* and their germs can be produced independently from, and outside of, the organism of swine; whether, in other words, swine-plague is a pure contagion, caused exclusively by means of the infectious or contagious principle, or can develop spontaneously, is a very important question, which can be solved only by protracted experiments, and may not be solved at all until the question as to whether a "*generatio equivoca*" is possible or actually taking place or not has found a definite solution. If the *bacilli suis* and their germs constitute the sole cause of swine-plague, as they undoubtedly do, the disease must be considered as a pure contagion, like many other contagious or infectious diseases, not capable of a protopathic or spontaneous development, as long as the possibility of a "*generatio equivoca*" is denied, but if the latter is admitted, or proved to be taking place, a spontaneous development must be considered not only as possible but also as very probable.

If the conclusions I have arrived at concerning the cause of the disease are correct, and I have scarcely any doubt they are, the question as to the causes has been solved. Still, as a *positive* knowledge of the true cause or causes is of the greatest importance, and as my experiments are not numerous enough to be absolutely conclusive, further investigations and more experiments of the same or of similar kind will

be very desirable, and, indeed, necessary, in order to obtain *absolute certainty* as to the true nature of the cause or causes.

One thing I am sure of, and that is that an exclusive corn diet, as has been asserted by several agricultural writers, wallowing in dirt and nastiness, starvation, in and in breeding, &c., although by no means calculated to promote health or to invigorate the animal organism, cannot constitute the cause and cannot produce a solitary case of swine-plague, unless the infectious principles (the *bacilli* and their germs) are present. If they are, then, of course, dirt and nastiness, consumption of unclean food and of dirty water, facilitate an infection, and warmth and moisture, pregnant with organic substances, or organic substances in a state of decay, are undoubtedly well calculated to preserve the bacillus-germs and to develop the *bacilli*.

Whether the disease can be communicated to other animals besides swine or not, is a question I am trying at present to decide. Some time ago I had an occasion to throw away some morbid tissues (parts of diseased lungs) of a diseased hog, which I had used for microscopical examination. I threw them—very carelessly, I admit—into an empty lot full of rank weeds, across the road. About a week after several chickens (four or five) died in the neighborhood, of so-called “chicken-cholera.” Although there was no proof whatever that these chickens had consumed the morbid tissues, there was a possibility that they had. I bought two healthy chickens, kept them separate, each in a coop, and fed them with the morbidly changed colon of a diseased pig. They consumed the same in my presence, but up to date (November 12th) no results have made their appearance. Further, as no case of an infection of any other animals besides swine has come to my knowledge, it would seem that swine-plague is a disease peculiar to swine like pleuro-pneumonia to cattle.

6. THE MORBID PROCESS.

Concerning the nature of the morbid process, or the manner in which the morbid changes are brought about, the microscope has made some important revelations.

In all those *post-mortem* examinations (fifty-three in number) which I have made since August 3rd, and in all those I had an opportunity of making before that time, I found the lungs more or less affected. The same were partially hepatized, and still partially filled with fluid exudation or blood-serum. Besides that, where the morbid changes in the lungs were of recent origin, innumerable small red specks, caused by capillary hyperemia, or, rather, a stagnation of the blood, or embolism in the capillaries, could be observed. In several other cases—four or five in number—where the morbid changes in the lungs were not of a recent origin, or older than, say, two weeks, innumerable small, round, and larger confluent tuberculous-looking centers of beginning suppuration or decay (incipient abscesses) presented themselves, especially in the lower and anterior portions of the lungs, and usually more pronounced in the right lobe than in the left one. My friend, Dr. Prentice, who is not only a veterinary surgeon, but also a practicing physician, pronounced the lungs of Mr. Bassett's boar (two years old, and three weeks sick), thus changed, similar or identical in appearance to the consumptive or tuberculous lungs of a human being. Close investigation, however, soon revealed the fact that all the morbid changes found in the lungs of different animals—innumerable small red specks, accumulation of blood-serum or exudation, hepatization, red, brown, and gray, and incipient abscesses—are the products or the consequences of extensive capillary em-

bolism. The other morbid changes, usually found in the thoracic cavity, such as pleuritis, pericarditis, accumulation of straw-colored serum, and the morbid changes found sometimes in the heart, but especially in the auricles, in which, in numerous cases, the capillary vessels have been found to be gorged with blood, tend also to show that embolism constitutes the cause, or at least the main cause, of all those changes. The microscope very fortunately has revealed how this embolism is effected. The capillaries of the lungs, as is well known, are narrower than those in other parts of the body. The blood of the diseased animals, and especially the blood-serum deposited in the affected pulmonal tissue, contain invariably large numbers of bacillus-germs and *bacilli*. These bacillus-germs, as I have observed with the microscope, and as Hallier, who calls them micrococci, nine years ago found, bud and develop to *bacilli*, and show, at a certain period of their development, a great tendency to agglutinate to each other, and to form in that way larger or smaller, irregular-shaped, and apparently somewhat viscous clusters. (See drawing II, fig. 1; drawing IX, fig. 1 a.) These clusters, or some of them, are large enough to close or to obstruct the finer capillaries, and to stop in that way the capillary circulation. As a necessary consequence, the serum of the blood transudes through the walls of the capillary vessels, and is deposited in the tissue of the lungs, in the thoracic cavity, and in the pericardium. In some cases, and at some places, the tender walls of the finer capillaries yield to the pressure and rupture, and then extravasations of blood, such as have been observed in several cases, are the consequence. The capillary redness, and the red and purple spots observed in certain comparatively fine portions of the skin, and in the subcutaneous tissues, I have no doubt are also a product of the same process, and are caused by capillary embolism. If the animals would only live long enough, gangrene or mortification of parts of the skin would be met with quite often, but as other morbid changes cause death, and thus terminate the morbid process usually before the stagnation of the blood in the skin becomes perfect, gangrene or mortification has been found only once in the skin on the lower surface of the body. Certain morbid changes in the abdominal cavity, such as abdominal dropsy, and the blood extravasations found repeatedly in various organs, such as stomach and intestines, are due to the same cause. The clusters of bacillus-germs also constitute probably the cause of the swelling of the lymphatic glands. Microscopic examinations of the interior of those glands (see drawing IV, fig. 3) revealed invariably, besides some lymph-corpuscles, immense numbers of *bacilli* and bacillus-germs in different stages of development, some budding, some agglutinated to each other, and some in process of agglutination, &c. These clusters of bacillus-germs, it seems, not only close the capillary blood-vessels, but probably also the finer lymphatics ramifying in the glands; a swelling of the latter, therefore, is a natural consequence.

The production of the morbid growths (swine-plague tumors would be a good name), which are found in nearly every case on the mucous membrane of the cæcum and colon, and sometimes, though not so often, on the mucous membrane of other intestines, such as ilium, jejunum, duodenum, stomach, gall-bladder, and uterus, and even on the conjunctiva and the gums, is not so easily explained. It seems that a proliferous process is taking place; new epithelium-cells and connective-tissue corpuscles are formed rapidly, but decay before fully developed. These new morbid and rapidly decaying cells are imbedded in a stroma of a dense connective tissue which, too, is a morbid product, and formed rapidly. In the older and larger morbid growths or tumors in the cæcum and colon this

connective tissue is usually very abundant, especially in the frequently pedicle-shaped foot or basis. The proliferous morbid growths which occur in the small intestines are almost destitute of it. If these morbid growths or tumors are examined under the microscope, immense numbers of *bacilli suis*, some of them moving very rapidly and others at rest (sometimes some other bacteria), and comparatively few bacillus-germs will be seen. (See drawing III, fig. 5; drawing VI, fig. 1; drawing V, fig. 2; drawing IV, fig. 2; drawing VII, fig. 2, and drawing X, fig. 2.)

It appears to be probable that the excessive proliferous growth of the epithelium-cells and connective-tissue corpuscles is caused by a constant irritation of the mucous membrane, or of the *membrana intermedia* (basement or limitary membrane, Fleming) produced by the *bacilli*. This is the more probable, as those morbid growths occur especially in such parts of the alimentary canal in which the food is known to tarry the longest, in the cæcum and in the colon. The morbid changes (ulcerations) found occasionally in the skin, where they sometimes cause whole portions to become mortified or decayed and to slough off, occur, it seems, only in parts where a wound or lesion has been existing into which the infectious principle, the *bacilli* or their germs, have been introduced; so, for instance, in the teats of brood-sows wounded by pigs, and in the nose of hogs and pigs that have been ringed. These morbid changes in the skin, it would seem, are produced in a similar way as the morbid growths in the intestines, with only this difference, that instead of an excrescence loss of substance makes its appearance. The skin is constantly exposed to the atmospheric air, and to a much lower and more changeable temperature than the mucous membrane of the intestines, and in consequence of that the process of decay may be more rapid and may exceed the probably slower process of production.

7. PERIOD OF INCUBATION.

The period of incubation—perhaps more correctly “stage of colonization,” Klebs—or the time passing between an infection and the first outbreak of the disease, I have found to be from five to fifteen days, or on an average of about seven days. Still, I have no doubt that in single cases an outbreak may take place a day or two sooner, and in others, though rarely, a day or two later.

8. MEASURES OF PREVENTION.

As swine-plague is a contagious or infectious disease, which spreads everywhere by means of direct and indirect infection, and as a spontaneous development is problematic, or has not yet been proven, the principal means of prevention must consist in preventing a dissemination of the contagious or infectious principle, and in an immediate, prompt, and thorough destruction of the same wherever it may be found. To prevent successfully a dissemination of the contagion and to secure a prompt destruction of the same, Congressional legislation will be necessary. State legislation, for reasons to be mentioned hereafter, will never be sufficiently effective. As it is, the contagion or the infectious principle is, and has been, disseminated through the whole country in a wholesale manner, as I shall show immediately. During the first month of my presence in Champaign I stopped at the Doane House, a hotel belonging to the Illinois Central Railroad Company, and constituting also the railroad depot. Every night car-loads of diseased hogs destined for Chicago passed my window. Only a very short time ago, on one of the last

days of October, a farmer, J. T. M., living near Tolono, sold sixty-seven hogs (some, if not all of them, diseased and a few of them already in a dying condition) for two cents a pound, to be shipped to Chicago. I could cite numerous instances, but I think it is not necessary, because these facts are known to every one where swine-plague is prevailing. Besides, in nearly every little town in the neighborhood of which cases of swine-plague are of frequent occurrence, is a rendering establishment to which dead hogs are brought. These establishments pay one cent a pound, and the farmers haul their dead hogs, sometimes ten or fifteen miles, in open wagons, past farms, barns, and hog-lots, and disseminate thereby the germs of the disease through the whole country. The transportation of dead hogs by wagon, I admit, might be stopped by State laws, but the latter prove usually to be ineffective where railroad companies (inter-State and international traffic) are concerned. I include international traffic, because swine-plague is or has been prevailing in Europe. Besides that, there are other contagious diseases which spread exclusively by means of their contagion—I will mention only glanders, foot and mouth disease, aphthæ, and pleuro-pneumonia of cattle—and can be stamped out and be prevented from spreading only by efficient Congressional legislation. Pleuro-pneumonia particularly deserves special attention. It has already gained a firm foothold in the East, and would undoubtedly invade the West very soon, or would have done so long ago, if the traffic in cattle were from East to West instead of from West to East. It may, however, at any time be carried to the West by shipments of blooded cattle from the East the same as it was imported from Holland to New York, and having once entered any of the Western States or Territories it will soon find ample means to spread toward the East again and to sweep the whole country. If it comes to that it will prove to be much more disastrous to the live-stock interest of the United States than swine-plague or any other contagious disease.

If any transportation of, or traffic in, diseased and dead swine is effectually prohibited by proper laws, a spreading of the swine-plague on a large scale will be impossible, and its ravages will remain limited to localities where the disease-germs have not been destroyed, and been preserved till the same find sufficient food again. In order to prevent such a local spreading, two remedies may be resorted to. The one is a radical one, and consists in destroying every sick hog or pig immediately, wherever the disease makes its appearance, and in disinfecting the infected premises by such means as are the most effective and the most practicable. If this is done, and if healthy hogs are kept away from such a locality, say for one month after the diseased animals have been destroyed, and the sties, pens, &c., disinfected with chloride of lime or carbolic acid, and the yards plowed, &c., the disease will be stamped out. I know that this is a violent way of dealing with the plague, but in the end it may prove to be by far the cheapest. The other remedy is more of a palliative character, and may be substituted if swine-plague, as is now the case, is prevailing almost everywhere, or in cases in which the radical measures are considered as too severe and too sweeping. It consists in a perfect isolation of every diseased herd, not only during the actual existence of the plague but for some time, say one month, after the occurrence of the last case of sickness, and after the sties and pens have been thoroughly cleaned and disinfected with carbolic acid or other disinfectants of equal efficiency, and the yards, &c., plowed. Old straw-stacks, &c., must be burned, or rapidly converted into manure. It is also very essential that diseased animals are not allowed any access to running water, streamlets, or creeks accessible to other healthy

swine. Those healthy hogs and pigs which are within the possible influence of the contagious or infectious principle, perhaps on the same farm or in the immediate neighborhood of a diseased herd, must be protected by special means. For these, I think, it will be best to make movable pens, say eight feet square, of common fence-boards (eleven fence-boards will make a pen); put two animals in each pen; place the latter, if possible, on high and dry ground, but by no means in an old hog-lot, on a manure-heap, or near a slough, and move each pen every noon to a new place, until after all danger has passed. If this is done the animals will not be compelled to eat their food soiled with excrements, and as dry earth is a good disinfectant, an infection, very likely, will not take place. Besides this, the troughs must always be cleaned before water or food is put in, and the water for drinking must be fresh and pure, or be drawn from a good well immediately before it is poured into the troughs. Water from ponds, or that which has been exposed in any way or manner to a contamination with the infectious principle, must not be used. If all this is complied with, and the disease notwithstanding should make its appearance and attack one or another of the animals thus kept, very likely it will remain confined to that one pen.

If the hogs or pigs cannot be treated in that way, it will be advisable to keep every one shut up in its pen, or in a bare yard, from sundown until the dew next morning has disappeared from the grass, and to allow neither sick hogs nor pigs, nor other animals, nor even persons, who have been near or in contact with animals affected with swine-plague, to come near the animals intended to be protected. That good ventilation and general cleanliness constitute valuable auxiliary measures of prevention may not need any mentioning. The worst thing that possibly can be done, if swine-plague is prevailing in the neighborhood, is to shelter the hogs and pigs under or in an old straw or hay stack, because nothing is more apt to absorb the contagious or infectious principle, and to preserve it longer or more effectively than old straw, hay, or manure-heaps composed mostly of hay or straw. It is even probable that the contagion of swine-plague, like that of some other contagious diseases, if absorbed by or clinging to old straw or hay, &c., will remain effective and a source of spreading the disease for months, and maybe for a year.

Therapeutically but little can be done to prevent an outbreak of swine-plague. Where it is sufficient to destroy the infectious principle outside of the animal organism, carbolic acid is effective, and, therefore, a good disinfectant; but where the contagious or infectious principle has already entered the animal organism its value is doubtful. Still, wherever there is cause to suspect that the food or the water for drinking may have become contaminated with the contagion of swine-plague, it will be advisable to give every morning and evening some carbolic acid, say about ten drops for each animal weighing from one hundred and twenty to one hundred and fifty pounds, in the water for drinking; and wherever there is reason to suspect that the infectious principle may be floating in the air, it will be advisable to treat every wound or scratch a hog or pig may happen to have immediately with diluted carbolic acid. During a time, or in a neighborhood in which swine-plague is prevailing, care should be taken neither to ring nor to castrate any hog or pig, because every wound, no matter how small, is apt to become a port of entry for the infectious principle, and the very smallest amount of the latter is sufficient to produce the disease.

Still, all these minor measures and precautions will avail but little unless a dissemination of the infectious principle, or disease-germs, is made impossible. 1. Any transportation of dead, sick, or infected swine,

and even of hogs or pigs that have been the least exposed to the contagion, or may possibly constitute the bearers of the same, must be effectively prohibited. 2. Every one who loses a hog or pig by swine-plague must be compelled by law to bury the same immediately, or as soon as it is dead, at least four feet deep, or else to cremate the carcass at once, so that the contagious or infectious principle may be thoroughly destroyed, and not be carried by dogs, wolves, rats, crows, &c., to other places.

Another thing may yet be mentioned, which, if properly executed, will at least aid very materially in preventing the disease; that is, to give all food either in clean troughs, or if corn in the ear is fed, to throw it on a wooden platform which can be swept clean before each feeding.

9. TREATMENT.

If the cause and the nature of the morbid process and the character and the importance of the morbid changes are taken into proper consideration, it cannot be expected that a therapeutic treatment will be of much avail in a fully developed case of swine-plague. "Specific" remedies, such as are advertised in column advertisements in certain newspapers, and warranted to be infallible, or to cure every case, can do no good whatever. They are a downright fraud, and serve only to draw the money out of the pockets of the despairing farmer, who is ready to catch at any straw. No cure has ever been found for glanders, anthrax, and cattle-plague, diseases that have been known for more than two thousand years, and that have been investigated again and again by the most learned veterinarians and the best practitioners of Europe, and yet there is to-day not even a prospect that a treatment will ever be discovered to which those diseases, once fully developed, will yield. Neither is there any prospect or probability that fully developed swine-plague will ever yield to treatment. It is true that the *bacilli suis* and their germs can be killed or destroyed if outside of the animal organism, or within reach on the surface of the animal's body. Almost any known disinfectant—carbolic acid, thymic acid, chloride of lime, creosote, and a great many others—will destroy them. But the *bacilli* and their germs are not on the surface of the body, except in such parts of the skin and accessible mucous membranes (conjunctiva and gums) that may happen to have become affected by the morbid process. They are inside of the organism, and not only in every part and tissue morbidly affected, in every morbid product, and in every lymphatic gland. They are also in every drop of blood and in every particle of a drop of blood circulating in the whole organism. Who, I would like to ask, will have the audacity to assert that he is able to destroy those *bacilli* and their germs without disturbing the economy of the animal organism to such an extent as to cause the immediate death of the animal? But even if means should be found by which these *bacilli* and their germs can be destroyed without serious injury to the animal, a destruction of the same will not be sufficient to effect a cure. Important morbid changes must be repaired; extensive embolism is existing in some very vital organs; a rapid, proliferous growth of morbid cells has set in; some of the intestines (cæcum and colon) may have become perforated; exudations have been deposited in the lungs, in the thoracic cavity, in the pericardium, and in the abdominal cavity; the heart itself may have been morbidly changed, and every lymphatic gland in the whole organism become diseased. How, I would like to know, will those quacks who advertise their "Sure Cure" and their high-sounding "Specifics" to swindle the farmer out of

his hard-earned dollars and cents—how, I ask, will those quacks restore, repair, stop, and reduce all those morbid changes?

Still, I do not wish to say that a rational treatment can do no good; on the contrary, it may in many cases avert the worst and most fatal morbid changes, and may thereby aid nature considerably in effecting a recovery in all cases in which the disease presents itself in a mild form, and in which very dangerous or irreparable morbid changes have not yet taken place. A good dietetical treatment, however, including a strict observation of sanitary principles, is of much more importance than the use of medicines. In the first place, the sick animals, if possible, should be kept one by one in separate pens. The latter, if movable—movable ones, perhaps six to eight feet square and without a floor, are preferable—ought to be moved once a day, at noon, or after the dew has disappeared from the grass; if the pens are not movable, they must be kept scrupulously clean, because a pig affected with swine-plague has a vitiated appetite, and eats its own excrements and those of others, and, as those excrements contain innumerable *bacilli* and their germs, will add thereby fuel to the flame; in other words, will increase the extent and the malignancy of the morbid process by introducing into the organism more and more of the infectious principle. The food given ought to be clean, of the very best quality and easy of digestion, and the water for drinking must be clean and fresh, be supplied three times a day in a clean trough, and be drawn each time, if possible, from a deep well. Water from ponds and water that has been standing in open vessels, and that may possibly have become contaminated with the infectious principle, should not be used. If the diseased animal has any wounds or lesions, they must be washed or dressed from one to three times a day with diluted carbolic acid or other equally effective disinfectants.

Concerning a therapeutic treatment, I have made several experiments, the principal ones of which I will relate, not because they are illustrative of success, as they are not, but because some interesting features of the disease will be brought to light. A therapeutic treatment—that is, as far as my experiments are able to show—has not been very successful, but the facts will speak for themselves.

1. EXPERIMENTS AT MY EXPERIMENTAL STATION, THE VETERINARY HOSPITAL OF THE ILLINOIS INDUSTRIAL UNIVERSITY.

October 8.—At 5.30 o'clock, p. m., received from Mr. J. A. Hossack eight diseased swine of various size and age for experimental treatment. They were put in pen No. 3, which had been thoroughly cleaned, and were fed three times a day with corn in the ear, and provided with clean water for drinking. I had engaged and had comfortable room for only three or four, but Mr. Hossack thought best to bring me every sick animal he had at that time on his place. So it happened that five of the pigs were in an almost dying condition when they arrived. I numbered them I, II, III, IV, V, VI, VII, and VIII. The therapeutic treatment consisted in giving three times a day about ten drops of carbolic acid in the water for drinking for each hundred pounds of live weight. In deciding upon that amount, it was taken into consideration that some of the water would remain unconsumed. The troughs were emptied and cleaned each time before fresh water was put in.

October 9.—Pig I, a small animal, dead. *Post-mortem* examination was made by Dr. Prentice, and revealed the usual morbid changes—hepatic

zation, pleuritis, serum in pericardium, and morbid growths in cæcum and colon.

October 10.—Pig II, a large shoat from eight to ten months old, dead. *Post-mortem* examination by Dr. Prentice. Nearly the same results.

October 11.—Pig III, a small animal, dead. It had probably died on the evening of the 10th; at least it was very much decomposed in the morning, and as pig B had died and had to be examined, no *post-mortem* examination was made.

October 12.—Pig IV, dead; had died during the night. No. V, an old sow, and Nos. VI, VII, and VIII yet alive. No. VIII is the only one that has any appetite. Pig VI is very low, and will soon die. *Post-mortem* examination of No. IV. Externally: skin on lower surface of the body and between the legs purple. Internally: lymphatic glands enlarged; bronchial tubes filled with mucus; both lobes of the lungs, but the left one more than the right, hepatized—red, brown, and gray hepatization; two ounces of straw-colored serum in pericardium, and plastic exudations on the surface of the heart. In abdominal cavity about one pint of serum; spleen enlarged; kidneys normal; mesenteric glands enlarged; intestines free from any morbid growths, and without any lesions whatever; interior of stomach slightly covered with bile.

October 13.—Old sow No. V, and young sow No. VIII (eight months old) have a little appetite. No. VI is very weak, and No. VII is dull; seems to have considerable pressure upon the brain. In the evening No. VI is in a dying condition, and lies motionless in a corner. Sows Nos. V and VIII have some appetite; No. VII breathes with a throbbing motion of the flanks; seems to have headache, is very dull, and holds its nose persistently to the floor.

October 14.—Sow VIII considerably improved; sow V some appetite; VII very low; and VI dead. For *post-mortem* examination of No. VI, see account given in the chapter on Morbid Changes.

October 15.—Old sow No. V and sow No. VIII coughing a good deal; VIII has a good appetite; V has not. No. VII, a sow pig about eight months old, dead in the pen. *Post-mortem* examination of No. VII at 8.30 o'clock, a. m. Externally: Skin on nose, neck, and lower surface of body purple in spots and patches; carcass not very much emaciated. Internally: some adhesion between posterior part of right lobe of lungs and diaphragm; costal pleura and pericardium affected; surface of the lungs exhibit numerous small red specks; both lobes are partially hepatized, and contain considerable exudation yet in a fluid condition. (See photographs, Plates I and II.) External coat of posterior vena cava morbidly changed, inflamed, and coalesced with pulmonal pleura. In abdominal cavity: numerous light-colored nodules or tubercles on the surface of the spleen, some of the size of a millet seed, and others as large as a small pea; mesenteric glands very much enlarged; numerous small ulcerous tumors or morbid growths on mucous membrane of cæcum and colon; the whole interior surface of jejunum, for several feet in length one interrupted layer of a morbid growth and subsequent decay of epithelium cells, easily removed with the back of the scalpel, and leaving behind, if thus removed, an uneven villous surface.

October 16.—Old sow No. V and sow No. VIII fair appetite; both cough a great deal. Old sow V discharged yesterday and to-day large quantities of a glassy mucus exuding from the nose. Discovered two ulcerating sores, one in the left middle teat and one in the right forward teat. Her pigs had been weaned a short time before she contracted the disease.

October 17.—Sows V and VIII improving, that is, are less indifferent to surroundings and have better appetite, but still cough a great deal.

October 18.—Sows V and VIII improving; but especially VIII, which has good appetite. In afternoon sow V had some diarrhea, probably caused by feeding on new corn—old corn had been fed before.

October 19.—Old sow V has diarrhea; feces green and semi-fluid. Sow VIII seems to be improving, at least eats a good deal. Sow V is perfectly blind.

October 20.—Sows V and VIII still coughing considerably, but are otherwise improving.

October 21.—Sows V and VIII improving; VIII is already in a little better condition.

October 22.—Sows V and VIII improving.

October 23.—Sow V is still very slow in her movements, but her appetite is much better. Sow VIII still shows difficulty of breathing, but may otherwise be considered as recovered. The diarrhea of sow V has disappeared.

October 24.—Sows V and VIII improving; have good appetite, and are not near so thirsty as formerly; both cough some. Recovery may be considered certain.

October 25.—Sow V very much improved; ulcer in forward teat is healing rapidly (the ulcers have been treated with diluted carbolic acid). Sow VIII shows no morbid symptoms, except some coughing and some difficulty of breathing. She has very good appetite and is very lively.

October 26.—Sow V eats tolerably well, but is still weak. Sow VIII eats and drinks well, and might be looked upon as perfectly healthy if it were not for the yet existing difficulty of breathing. The excrements have gradually lost their peculiar offensive smell.

October 27.—Sow V fair, and sow VIII very good appetite. The latter is getting lively.

October 28.—No perceptible change.

October 29.—Sow V more active, but still partially blind. Sow VIII is gaining in flesh.

October 30.—Both sows have good appetite and are visibly improving.

October 31.—Both improving steadily.

November 1.—Sows V and VIII keep on improving. The ulcers of V have healed, and her sight has been partially restored. The carbolic-acid treatment has been continued to this day (November 1), but is now discontinued.

November 6.—Both sows have been returned to their owners. Sow VIII is like a perfectly healthy pig, but coughs some and also shows a slight difficulty of breathing. Sow V has almost entirely recovered her eyesight; is not in as good condition as sow VIII, and coughs some, but breathes perfectly easy.

October 26.—Received of Mr. D. Burwash, at 6 o'clock, a. m., a Berkshire pig, about five months old, for experimental purposes; it had been sick two or three days. It proved to be very severely affected, but was in a good condition as to flesh. Treatment: about eight or nine drops of carbolic acid in the water for drinking every morning, and about two drams of bisulphite of soda and one dram of carbonate of soda every evening. The pig was designated as No. IX, and put in pen No. 2.

October 27.—Pig No. IX worse; has plain symptoms of pneumonia; died in the afternoon. *Post-mortem* examination three hours after death; four ounces of serum in chest, and also a like quantity in pericardium; trachea filled with mucus; both lobes of lungs congested and gorged with exudation; capillary vessels of the auricles of the heart gorged

with blood; spleen enlarged, and large numbers of tubercle-like excrescences on its lower surface; cæcum and colon full of hardened feces; a few ulcerous tumors in cæcum, and two large decaying morbid growths in colon; mesenteric glands enlarged; other organs healthy.

Numerous other experiments have been made, and quite a variety of medicines have been tested at different places and in different herds. Some of those experiments have been carried out under my personal superintendence, and some by the owners of the diseased animals in accordance with my instructions. But as the results obtained with any one of them are far from satisfactory, it will be sufficient to mention only a few. The principal medicines tried were carbolic acid, bisulphite of soda, thymol, salicylic acid, white hellebore or *veratrum album*, as an emetic, alcohol, and sulphate of iron, and it has been found that neither of them possesses any special curative value. In a few cases in which most of the lesions were external, applications of very much diluted thymol or thymic acid produced apparently good results; the animals recovered, but might have recovered at any rate. Diluted carbolic acid has been used for the same purpose and with the same results. An emetic of white hellebore or *veratrum album* was given to some shoats (about eight or nine months old, and property of Dr. Hall, at Savoy), in the first stage of the disease, and seemed to have arrested the morbid process immediately, at least the shoats recovered. In other more developed cases it did no good whatever. Bisulphite of soda, salicylic acid, and carbolic acid were used quite extensively, but no good results plainly due to the influence of those drugs have been observed in any case in which the disease had fully developed, neither by myself nor by others. Sulphate of iron has proved to be decidedly injurious. Mr. Bassett used it quite persistently for forty-five nice shoats. Forty-three of them died, one recovered from a slight attack—it had external lesions, which were treated with carbolic acid—and one remained exempted. To bleed sick hogs, in some places a customary practice among farmers against all ailments of swine, has had invariably the very worst consequences, and accelerated a fatal termination. A great many farmers in the neighborhood of Champaign have used several kinds of “specifics” and “sure cure” nostrums, but none of them are inclined to talk about the results obtained, and so it must be supposed that the latter have remained invisible. One case, which should have been related in the chapter on “Prevention,” deserves to be mentioned. Mr. Crews had forty-odd hogs, of which he had lost ten or twelve, and was losing at the rate of two to four a day. I advised him to separate those apparently yet healthy, or but slightly affected, from the very sick ones; to put the former in a separate yard, not accessible to the others; to feed them clean food; to water them three times a day from a well, and to give to each animal, two or three times a day, about ten drops of carbolic acid in their drinking water. He did so, and saved every one he separated (fourteen in number), while all others, with the exception of two animals which died later, died within a short time.

Respectfully submitted.

H. J. DETMERS, V. S.

CHICAGO, ILL., November 15, 1878.

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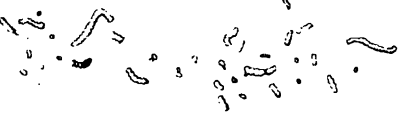


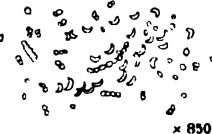
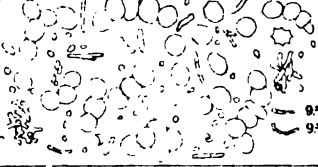


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Microscopical Investigations by Dr H. J. Detmers.

Germ.

 <p>1. Urin of experimental pig x 500. 22. 9. 78</p>		
 <p>2. Boiled milk, having been exposed 60 hours to a temper of 92° F. x 850. 8 P.M. 22. 9. 78.</p>	<p>eria. 9. 78.</p>	
 <p>3 Same milk charged with less than half a drop blood of Harris x 850. 8¹⁰ P.M. 22. 9. 78</p>	<p>of Mr. er's pig. 23. 9. 78.</p>	
 <p>4. Mutton broth, exposed the same time as milk No 1 to 92° F. x 850. 9¹⁰ P.M. 22. 9. 78.</p>	<p>all speck er. 26. 9. 78.</p>	
 <p>5. Same mutton broth, ex to same temperature, but at at 8¹⁰ A.M. 21. 9. 78. with less than quarter of a drop of blood of Mr. Harris's pig x 850. 9¹⁰ P.M. 22. 9. 78.</p>	<p>9. 78. 30. 8. 78</p>	
 <p>II 1 Blood of experimental pig 7 P.M. 30. 9. x 850.</p>	<p>9¹⁰ 9¹⁰ 10¹⁰ 10¹⁰ 10¹⁰ 11</p>	<p>round lungs 14. 10. 78.</p>
 <p>2. Matter from spermatic chord of pig No 6. 8 P.M. 30. 9. 78. x 850.</p>	<p>ci show 2 hours. in the pig. 28. 9. 78.</p>	<p>g been d-heat 17. 10. 78.</p>
 <p>3. Serum of the lung of experimental pig No 6. x 850. 9 P.M. 30. 9.</p>		<p>tion. from 10. 78.</p>

SUPPLEMENTAL REPORT.

SIR: Since the 15th of November, the day on which I forwarded to you my full report, I have devoted my time principally to a solution of some of those questions which had not been fully answered, and have succeeded in ascertaining some additional facts of practical importance. In addition to this the correctness of my conclusions as to the nature of the infectious principle, and the manner in which swine-plague is communicated, has been confirmed by further observations. The vitality of the infectious principle has been tested by experiment; several herds of diseased swine and places where the disease had been prevailing, and where healthy pigs had been introduced a few weeks after the occurrence of the last case of swine-plague, have been visited, and a few more *post-mortem* examinations have been made. In the following, which may be considered as a supplement to my report of the 15th of November, I have the honor of submitting to you, very respectfully, the results of my investigation.

I. THE BACILLI SUIS.

These are found invariably, either in one form or another, in all fluids—such as blood, urine, mucus, fluid exudations, &c.—in all morbidly affected tissues, and in the excrements of the diseased animals, and constitute, beyond a doubt, the infectious principle, or produce the morbid process if transmitted, directly or indirectly, from a diseased animal to a healthy one. These *bacilli* undergo several changes, and require a certain length of time for further propagation; consequently, if introduced into an animal organism, some time—a period of incubation, or a stage of colonization—must pass before morbid symptoms can make their appearance. Three stages of development (a germ or micrococcus stage, a bacillus or rod-bacterium stage, and a germ-producing stage) can be discerned.

The micrococci, globular bacteria, or bacillus-germs, as I prefer to call them, are found in immense numbers in the fluids, but especially in the blood and in the exudations of the diseased animals. If the temperature is not too low, and if sufficient oxygen is present, they soon develop or grow lengthwise, by a kind of budding process—a globular bacterium, or bacillus-germ, constantly observed under the microscope, budded, and grew to double its length in exactly two hours in a temperature of 70° F. (see drawing)—and change gradually to rod-bacteria, or *bacilli*. Some of the latter, finally, after a day or two, if circumstances are favorable, commence to grow again in length, until they appear, magnified 850 diameters, to be from one to six inches long. At the same time, however, they become very brittle, and break into two or more pieces. Where a break or separation is to take place, at first a knee or angle is formed, and then a complete break or separation is effected by a swinging motion of both ends, which move to and fro, and alternately open and close, or stretch and bend the knee or angle. After the division has become perfect, which takes only a minute or two, both ends, thus separated, move apart in different directions. These long bacteria, it seems, are pregnant with new germs; their external envelop disappears or is dissolved, and then the very numerous bacillus-germs become free. In this way a propagation is effected.

Some of the *bacilli* or rod-bacteria move very rapidly, while others are apparently motionless. The causes of this motion I have not been able to ascertain with certainty, but have observed repeatedly that no motion takes place if the temperature of the fluid or substance which contains the bacteria is a low one, and that under the microscope the motion increases and becomes more lively if the rays of light, thrown upon the side by the mirror, are sufficiently concentrated to increase the temperature of the object. So it seems that a certain degree of warmth is required; at any rate I never saw any *bacilli* moving in a fluid or substance immediately after it had been standing in a cold room.

There is, however, also another change taking place, caused probably by certain conditions which I have not been able to ascertain. It is as follows: The globular bacteria or bacillus germs commence to bud or grow in length, but on a sudden their development, it seems, ceases, and partially-developed *bacilli* and simple and budding germs congregate to colonies, agglutinate to each other, and form larger or smaller irregularly-shaped and (apparently) viscous clusters. Such clusters are found very often in the blood and in other fluids, and invariably in the exudations in the lungs; and in the lymphatic gland in pulmonary exudation, and in blood serum, this formation can be observed under the microscope if the object remains unchanged for some time, say for an hour or two. In the ulcerous tumors on the intestinal mucous membrane the clusters are comparatively few, but the fully-developed *bacilli*, many of which move very lively, are always exceedingly numerous. The tumors or morbid growths in the intestines seem to afford the most favorable conditions for the growth and development of the *bacilli* and their germs. That this must be the case is also suggested by the presence of such immense numbers of *bacilli* and bacillus-germs in the excrements,

that the latter, beyond a doubt, constitute the principal disseminator of the infective principle. Whether the colonies or viscous clusters of bacillus-germs and partially developed *bacilli* are instrumental in bringing about the extensive embolism in the lungs and in other tissues, by merely closing the capillary vessels in a mechanical way, or whether the presence, growth, development, and propagation of the *bacilli* and their germs produce peculiar chemical changes in the composition of the blood, which disqualify the latter to pass with facility through the capillaries, or which cause a clotting or retention of the same in the capillary system, is a question which I am not prepared to decide. According to my own observations, it appears that the colonies or viscous clusters of bacillus-germs and partially developed *bacilli* get stuck in the capillaries so as to obstruct the passage, and constitute in that way the principal, if not the sole, cause of the embolism. Dr. Orth is of a different opinion. He says: "The principal effect of the 'Schizomycetes' (*bacteria*, *bacilli*, &c.) is an indirect one, viz., by producing a poison (virus)." (*Archiv. fuer wissenschaftliche und praktische Thierheilkunde*, 1877, page 1.) It is possible that the circulation of the blood in the capillary system is interfered with by both mechanical obstruction and chemical changes. Still, it seems to me that the observations of Dr. Orth and others apply more to the fully developed *bacilli* in the blood and in the lymph. The vitality of the bacillus-germs, and especially of the *bacilli*, is not a very great one, except where the germs are contained in a substance or a fluid not easily subject to decomposition; for instance, in water which contains a slight admixture of organic substances. If such a fluid is kept in a vial with a glass stop, the germs remain for a long time (over six weeks) in nearly the same condition, or develop very slowly, according to amount of oxygen and degree of temperature. In an open vessel the development is a more rapid one. If oxygen is excluded, or the amount available exhausted, no further change seems to be taking place. In the water of streamlets, brooks, ditches, ponds, &c., the bacillus-germs are not destroyed very soon. How long they retain their vitality I have not been able to ascertain. In fluids and substances subject to putrefaction, the *bacilli* and their germs lose their vitality and are destroyed in a comparatively short time; at least they disappear as soon as those fluids (blood, for instance) and substances undergo decomposition. In the blood they disappear as soon as the blood-corpuscles commence to decompose. That such is the case has been ascertained not only by microscopical observation, but also by clinical experience. The *bacilli* and their germs are also destroyed if brought in contact with, or if acted upon by, alcohol, carbolic acid, thymol, iodine, &c.

2. CLINICAL OBSERVATIONS.

The experimental pigs, Nos. 1 and A, put in pen No. 2, on November 13th (together with experimental pig C), in which pen pig No. IX had died of swine-plague on the 28th of October, remained perfectly healthy, notwithstanding pen No. 2, which was thoroughly infected, had received only an ordinary cleaning, but had not been disinfected. Consequently, it must be supposed that the infectious principle (the *bacilli* and their germs) contained in particles of excrement and in the urine clinging to the floor and lodged in the cracks between the boards must have been destroyed, because I observed repeatedly that the pigs, probably in search of saline substances, licked those parts of the floor which had become saturated with urine.

Mr. Bassett, who had lost nearly his whole herd of swine—of one lot containing originally forty-five animals only two survived—bought, about eighteen days after the occurrence of the last death, two young, healthy pigs, and allowed them to run at large in his orchard, a pasture, and one of his swine-yards, the same premises on which the lot of forty-five animals just mentioned had been kept. The few surviving hogs of his old herd are kept in another yard farther north. Seeing that those two pigs remained healthy, he thought he might risk it and buy some more, and about two weeks later he bought sixty-nine (not ninety-five, as I believe I have stated in my report) healthy Berkshire shoats, from five to six months old, at the auction of the Hon. James Scott, president of the Illinois State Board of Agriculture, and turned them out on the same premises (hog-lot, orchard, and pasture). After these sixty-nine shoats had been there two days they discovered the burial places of the forty-three dead shoats, hogs, and pigs, which, by the way, had been buried only from two to three feet deep. These they commenced to immediately exhume, and soon consumed all the decomposed carcasses. Mr. Bassett would have prevented this had he discovered them before they had accomplished it. Every shoat has remained healthy up to date (November 29th), and as the period of incubation (from five to fifteen days, or on an average seven days) expired some time ago, it must be supposed that the infectious principle, the *bacilli* and their germs, had been thoroughly destroyed by putrefaction. It must be mentioned that there are no straw-stacks, &c., on the swine-range, and that the shoats have no access to any streamlet, ditch, or pool of water.

Mr. Locke's herd of swine has been kept perfectly isolated in a pasture near the city limits of Champaign, and has remained exempt from swine-plague till lately. The hog-pasture is close to the Illinois Central Railroad track. Whether the infec-

tious principle has been introduced into Mr. Locke's pasture by the car-loads of diseased swine which pass by every evening, and which sometimes remain standing on the tracks, at a distance of not much over forty rods from the hog-pasture, for half an hour or longer; whether the vicinity of the rendering establishment has been instrumental in bringing about an infection; or whether the infectious principle has been communicated by other means, I have not been able to ascertain.

The herds of Mr. Clelland (or McClelland), nine or ten miles northwest of Champaign, and of Mr. Allen, six or seven miles northeast of Urbana, have remained exempt for a long time, probably because neither of them has any close neighbors, but finally the disease, spreading from farm to farm, has reached their herds.

Mr. Clay West, three and a half miles northwest from Champaign, living also somewhat isolated, expected that his swine (forty-seven head) would remain exempted. Most of them (forty-two or forty-three) obtained their water for drinking from a running streamlet which, three-fourths of a mile above, passes through the hog-pasture of another farm. On the latter swine-plague made its appearance, and three weeks later Mr. West's swine commenced to die. So it must be supposed that the infection had been brought about by the water in the streamlet. Mr. West, as soon as he found that his hogs commenced to die, sold twenty-seven head to be shipped to Chicago.

3. MORBID CHANGES AFTER DEATH.

Since November 15th I have made some more *post-mortem* examinations, mostly for the purpose of obtaining material for microscopical investigation; but have found nothing not found before, or of any special importance, except in one case, of which, therefore, a full account may not be superfluous. It was a pig of Mr. Clelland's (or McClelland's), who had lost four head out of seventeen within a few days, or after brief sickness. The pig in question, which was a little over four months old, had been sick only two or three days. The *post-mortem* examination was made on November 22d, about sixteen hours after the animal had died.

Externally.—Considerable capillary redness of a purple hue in the skin on the lower surface of the body, between the legs, and behind the ears. *Internally*.—Lower and anterior parts of both lobes of the lungs hepatized (red hepatization); the rest of both lobes gorged with blood-serum or fluid exudation; pericardium coated with plastic exudation; auricles of the heart congested, the capillary vessels tinged with dark-colored blood; lymphatic glands, but especially those of the mesenterium, very much swelled; liver, sclerotic; serous membrane of some of the intestines (cæcum and colon) coated with exudation; ecchymoses and capillary redness in pyloric portion of the stomach; and a few worms (*Trichocephalus crenatus*) in cæcum, but no morbid growths or ulcerous tumors whatever in any part of the digestive canal. This case is worth mentioning, because no morbid growths or ulcerous tumors were found in the cæcum and colon, or in other parts of the intestinal canal; it consequently shows once more that embolism and subsequent exudation in the lungs and in other tissues are more constant and more characteristic of the morbid process of swine-plague than the peculiar morbid growths or ulcerous tumors in the cæcum and colon.

Whether those ulcerous tumors on the intestinal mucous membrane occur only in cases in which the infectious principle has been introduced partly or wholly through the digestive canal, and are absent in those cases in which the *bacilli* and their germs have entered exclusively through wounds or lesions, or whether, finally, this presence or absence depends upon other influences and conditions, is a question which I am not fully prepared to answer. It has decidedly the appearance that the seat and the character of the morbid changes depend, to a certain extent at least, upon the means and parts by and through which the *bacilli* and their germs have entered the animal organism.

My opinion, expressed in my report of the 15th ultimo, that an infection is brought about either through the digestive canal or through wounds or lesions, and probably not through the respiratory mucous membrane and through the skin, if no wounds or lesions are existing, has been corroborated by an observation made at Mr. West's place. I was there on November 20th. The disease had made its appearance on November 10th. Mr. West had lost five animals, had sold twenty-seven more or less diseased, and still had fourteen or fifteen, including four or five older hogs kept in a separate pen, about 12 by 16, which had a wooden floor, and was separated from the hog-lot or hog-pasture only by a board fence. These older animals receive and have received their water for drinking from a well, while all those kept in the hog-lot or hog-pasture, originally forty-two in number, had access to the streamlet before mentioned. None of the older animals, although breathing the same atmosphere as the rest, showed any symptoms of disease, and are still healthy (November 29th), as far as I have been able to learn.

In conclusion, I may say that swine-plague does not seem to be communicable to any other domesticated animals, and must be considered as a disease *sui generis* peculiar to swine.

I intended to make further experiments, by inoculating healthy animals with blood-serum or pulmoal exudations, freed from *bacilli* and bacillus-germs by repeated filtrations and with cultivated *bacilli*, but the time left me (sixteen days) was not sufficient to obtain reliable results. Besides, it appeared to be desirable to use the pigs I had on hand for the purpose of testing the vitality of the infectious principle in such a way as would give the test a direct practical value.

I am, very respectfully, your obedient servant,

H. J. DETMERS, V. S.

CHICAGO, ILL., December 1, 1878.

REPORT OF DR. JAMES LAW.

Hon. WM. G. LE DUC,
Commissioner of Agriculture:

SIR: I have the honor to submit the following report of experiments and observations on the prevailing fever in hogs.

As you are already aware, my attention has been directed mainly to the pathology of the disease, the nature and vitality of the virus, and its behavior when treated by different disinfectants. Distant as Ithaca was from all infected districts, and seeing it was impossible here to experiment on large herds of diseased and exposed swine, it seemed preferable to leave to others all essays of treatment and prevention of the illness by the use of disinfectants and other sanitary measures. This isolated and noninfected locality offered special advantages for conducting that class of observations which I aimed at, as there was no danger of accidental infection from other sources than the experimental pens. At the same time the number of animals subjected to experiment was limited by the necessity for the most perfect isolation of the healthy and diseased, for the employment of separate attendants for each, and for the disinfection of instruments used for scientific observations, and of the persons and clothes of those who conducted these.

The experimental pens were constructed in a high open field, with nothing to impede the free circulation of air; they were large and roomy, with abundant ventilation from back and front, with perfectly close walls, floors, and roofs, and in cases where two or more existed in the same building the intervening walls were constructed of a double thickness of matched boards with building pasteboard between, so that no communication could possibly take place excepting through the open air of the field. When it seemed needful disinfectants were placed at the ventilating orifices. On the pigs showing the first signs of illness, infected pigs were promptly turned over to the care of attendants delegated for these alone, and the food utensils, &c., for the healthy and diseased were kept most carefully apart. When passing from one to the other for scientific observations, the healthy were first attended, and afterward the diseased, as far as possible in the order of severity. Then disinfection was resorted to, and no visit was paid to the healthy pigs until after the lapse of six or eight hours, with free exposure in the interval. In the pens the most scrupulous cleanliness was maintained and deodorizing agents used so as to keep them perfectly sweet.

I may be allowed to add that I have received most valuable assistance from two of my students, Messrs. A. M. Farrington and A. G. Boyer, in conducting the daily observations, as well as in making *post mortem* examinations, and in the examination of diseased products.

INCUBATION OF THE DISEASE.

Our experiments have shown this to vary greatly, though in the great majority of cases it terminated in from three to seven days after inoculation. As shown in the table appended, one sickened on the first day, three on the third, two on the fourth, one on the fifth, two on the sixth, four on the seventh, and one each on the eighth and thirteenth days respectively. A comparison of these results with those obtained elsewhere seems to show that we have reached the two extremes. Dr. Sutton, observing the result of contact alone in autumn, sets the period at from thirteen to fourteen days; my own observations in Scotland, in summer, indicated seven to fourteen days; Professor Axe, in London, in summer, concluded on five to eight days; Dr. Budd, in summer, four to five days; and Professor Osler, in autumn, four to six days.

SYMPTOMS.

The cases observed were of all degrees of severity, from a slight access of fever, with some loss of appetite, irregularity of the bowels, and alternations of heat and cold on the surface, to violent attacks, terminating fatally after eleven days' illness.

Early symptoms.—In an average case, one of the earliest signs of illness was an elevated temperature of the body, amounting to one or two degrees above the former indications furnished by the same animal. This qualification appears requisite, as the temperatures of healthy pigs were found to vary widely under different conditions of life. After active exercise or excitement 104° F. is not unfrequent, while in a close pen where they are quiet and still, 100° to 102° F. is quite as common. On more than one occasion, when a pig got accidentally fixed in a narrow space where he had barely room to stand, the temperature was reduced to 99° and even 98° F. The body heat was raised by a hearty meal and lowered by abstinence. Generally a sudden rise of temperature and saturation of the atmosphere with moisture led to an elevation of the body heat, in other cases a reduction of the temperature of the air led to the same phenomenon. (See table of Meteorological Observations and Temperatures.) In connection with the rise of temperature there was generally a diffuse redness of the skin, with increased warmth, alternating with cold, especially in the ears, nose, tail, and limbs. The pulse usually rose perceptibly, sometimes reaching 120 per minute, while the breathing was little if at all affected. The snout was often drawn back, giving a wrinkled or pinched appearance to the face; the movements were less active, sometimes decidedly stiff and slow; there was perceptible falling off in appetite, and the bowels were usually costive.

Disease at its height.—The temperature rose in most cases to 105° F., and exceptionally only to 107° or 108° F. (Dr. Osler records 110° F.), to be followed after a variable length of time (three to twenty days) by a descent to the natural standard, or even lower. The pulse also rose to 120–130, and the flushes of heat on the skin were much more frequent and extreme. At the same time certain changes appeared in the skin, varying greatly in degree in different cases, but which may be described as follows:

First. A pink or scarlet rash in spots averaging about one-tenth inch in diameter, but often becoming confluent so as to form an extended blush. Many such spots disappeared momentarily under pressure, showing that the minute blood-vessels were not yet completely blocked, but only dilated. Many, however, could not be even temporarily obliterated

by pressure, showing already existing embolism if not even rupture and the escape of the blood-elements into the tissue.

Second. In some, though by no means in all, there appeared black spots on which pressure had no effect. The cuticle of such spots dried up and shrunk, and if the pig survived long enough was finally detached.

Third. In nearly all there were slight pointed elevations, mostly around the roots of the bristles, which over the whole body had become more erect, rough, and harsh.

Fourth. Scattered more or less abundantly over the surface were black concretions, hardening in most cases into a scab, but in others, and particularly on the inner side of the thighs, accumulating as a soft, greasy inunction. Where this was not diffused as a uniform black incrustation, it showed as small black particles mostly at the roots of the bristles, and was evidently a product of the diseased sebaceous glands.

Fifth. The skin showed at many points, and above all on the pendent margins of the ears, on the hocks and knees, on the rump and abdomen, an unbroken blue or violet tint, which could not be effaced by pressure. In bad cases this was associated with considerable swelling of the ears, and in one with rupture of the integument and loss of blood.

Finally. A great accumulation of scurf took place along the back, and with the tough, rigid state of the skin contributed much to the unthrifty look of the subject.

The arching of the back, the drawing up of the flank, the advance of the hind toward the fore feet, and the stiff movements of the hind limbs sufficiently attested abdominal suffering, while the contractions of the rectum resisting the introduction of the thermometer testified in most cases to the irritability of the bowels, if not to the thickening and corrugation of their mucous membrane. The gait was stiff and uncertain, and the patient inclined to lie in its litter, by preference stretched on its belly. The bowels at this stage were mostly irritable. In the milder cases they were mostly costive, or if the dung was of natural consistency it smelt strongly. In the worst cases, and in several of the milder ones, they became relaxed with a semi-solid fetid discharge, or a yellowish white or slaty yellow watery flow, alternating with more confined or costive conditions. Vomiting was noticed once or twice, but was altogether exceptional. One patient ground its teeth, but one only. Several had a cough, occurring in paroxysms, but the majority had none, and this is the more remarkable that several of those that appeared to show this immunity harbored numerous lung-worms. In most cases the inguinal glands could be felt to be enlarged.

Stage of sinking.—When patients were approaching death, the temperature, after reaching its highest point, suddenly descended to below the natural, the pulse increased to 130 or even 160 per minute, extreme weakness supervened so that the animal could barely rise or drag itself around; in some cases the nervous powers were so dulled that the pig lay in a stupor, hardly disturbed when pricked to obtain a drop of blood for examination, and in others there seemed to be active delirium, with sudden starting and screaming. Nervous disorder was further shown by general tremors and muscular jerking of the limbs or body. If formerly purging, the anus became relaxed, and the liquid feces escaping involuntarily smeared the thighs and bed. In two this state of things lasted for two days before death supervened. At this stage moving bacteria were repeatedly detected in the blood.

Subsidence of fever.—In cases which seemed to promise recovery, including a majority of the whole, the temperature declined gradually

toward the natural standard, the bowels became more regular, the appetite improved, the skin cleared up, and all the bad symptoms steadily diminished. As it was not our object to preserve them they were either sacrificed or again inoculated, so that the too frequently tardy and imperfect or uncertain convalescence was not verified in our pens.

POST-MORTEM LESIONS.

In considering the morbid anatomy of the disease, the lesions of the skin referred to above under the head of symptoms need not be again recorded.

The characteristic lesions were found especially in the digestive organs, the lymphatic glands, and the lungs, though the serous membranes and other tissues were by no means always exempt.

Digestive organs.—In four cases the tongue was the seat of spots of a deep-blue color, inefaceable by pressure, and in three cases it bore distinct ulcers, similar to those to be described later as existing in the large intestine. Similar ulcers appeared on the soft palate, in two cases, and on the tonsils in one. In four cases the pharynx bore indelible blue spots of extravasation, but no distinct ulceration. In one instance a white concretion in four minute lobes, like pins' heads, was found on the mucous membrane on the back of one arytenoid cartilage, consisting of rounded nucleated cells and granular matter. In one case only did the gullet show patches of congestion. The stomach always contained a fair amount of food, usually smelt intensely acid, the exhalation fuming with ammonia, and presented on the mucous membrane of its great curvature a mottled, dark-brown discoloration, as is often seen in pigs that have been starved for some time prior to slaughtering. In four cases this membrane bore patches of thickening from $\frac{1}{4}$ to 1 inch in diameter, of a deep-red color, from blood extravasation into and beneath the mucosa. In two cases it bore a dirty yellowish-white pellicle of diphtheritic-looking false membrane, the microscopic characters of which will be noted hereafter. In one case slight erosion of the membrane had ensued, but without the formation of any slough.

The small intestines constantly presented spots of congestion, and sometimes extended tracks of the same, with softening of the mucous membrane and excessive production of mucus. The spots were easily overlooked unless when the entire length of the gut was slit open and carefully examined, but when closely examined they presented not only the branching redness resulting from coagulation of blood in the capillary blood-vessels, but also microscopic extravasations of the blood out of thin natural currents. Another point which served to characterize these limited congestions was a greater or less hæmorrhagic reddening of the mesenteric glands immediately adjacent to the congested spots. In three cases only were distinct erosions found on the small intestines, and in one, ulceration with the dirty-white central slough so common in the large intestines. The edge of the ileo-cæcal valve was twice the seat of a sloughing ulcer, and in four subjects the glandular follicles of Peyer's patch were enlarged at this point, a condition which is, however, not uncommon in pigs killed in health.

In the large intestines the lesions were at once more constant and more advanced. The cæcum was the seat of dark-red patches from congestion and extravasation in six cases, the colon in six, and the rectum in five. Ulcers appeared on the cæcum in eight cases, on the colon in seven, and on the rectum in three. In two cases the whole length of the large intestine was the seat of great thickening of the mucous membrane,

which was of a deep, dark-red color, and thrown into prominent transverse folds, that considerably diminished its internal caliber. The large intestine was more entirely free from slight congestion of the mucous membrane, and in two cases only were no ulcers found on this part.

The variety of these ulcers deserves a passing notice. In a certain number of cases the mucous membrane, though comparatively free from congestion, showed a number of small conical swellings, with yellowish depressed centers, and about the diameter of one-half a line. To the naked eye these appear like enlarged solitary glands, but have been shown by Dr. Klein, of London, to be enlarged and diseased mucous crypts (follicles of Lieberkühn.) Next, erosions of larger size were not uncommon. In these, the surface layer of the mucous membrane was destroyed, leaving a depressed, red, congested base, and swollen, slightly congested, and reddened edges. Then there are the older ulcers in which, with a more or less reddened base and margin, there is a central dirty-white product, arranged in concentric layers, and usually projecting above the line of the adjacent mucous membrane, and even overlapping it. This appears like a slough, and though sometimes stained with blood contains no pervious vessels. In one instance this slough, in place of occurring in rounded isolated forms, extended transversely to the direction of the intestine, occupying the limits of its morbid transverse folds for half the circumference of the canal, or even more. These bands were abundant in the cæcum and colon, and at intervals two adjacent ones would merge into each other at their widest parts. Finally, in one case, a great part of the surface of the cæcum and colon was covered by a yellowish-white diphtheritic-looking pellicle, in patches of several inches in length, and projecting above the surface of the mucous membrane at its free border.

In one case only was there a blood-colored liquid effusion into the peritoneum. In another, a transparent exudation between the folds of the mesentery contained a microscopic embryo worm; but the most careful search could detect no others at this point, nor in the coats of the intestines. In one case, whitish concretions were found on the mesentery, projecting from the surface and composed of granular cells like those of the concretion on the larynx.

Liver.—Slight ecchymosis on the surface of the liver was common, but extensive congestion, and above all softening, were virtually absent. When congestion existed the acini were most deeply colored in the center, showing the implication of the hepatic veins and intralobular flexus rather than the portal system. In two cases this organ contained slight caseous deposits, in one an *acephalocyst*, and several times *hydatids*.

The *pancreas* appeared to be uniformly healthy.

The *spleen* appeared unduly black and gorged with blood on two occasions only, and in the worst of these the blood was alive with actively-moving bacteria.

The *lymphatic glands* of the mesentery and of the abdomen generally may be said to have been uniformly altered. Those in the vicinity of congested or ulcerated patches of intestines were usually of a dark blood-red, confined to the surface of the gland, or in the worst cases extending through its entire substance. In cases where the disease had passed the crisis, and the subject was advancing towards recovery, there was often simply a grayish discoloration of the surface of the gland, where such hæmorrhagic discoloration would have been found in the earlier stages. In all cases the glands appeared to be materially enlarged.

These remarks would equally apply to the lymphatic glands in the chest, throat, or other parts where congestion and ecchymosis existed.

SWINE FEVER.

Report Commissioner of Agriculture for 1878.

Plate IX.

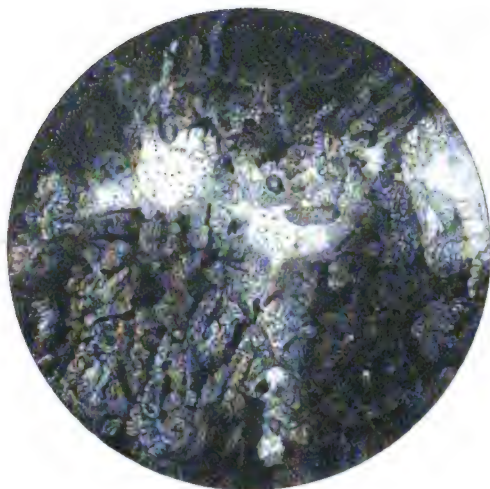


Fig 1.
Microscopic section through skin and slough.



Fig 2.
Microscopic section of skin in purple spot.



Respiratory organs.—Congestions and ecchymosis were common on the larynx, windpipe, and pleuræ. Though the lungs never entirely escaped, in one case only was an entire lung hepatized. Exudation and consolidation of the lung-tissue were in a few instances confined to the anterior lobes, but as a rule a few of the posterior lobules only were affected. In some cases exudation was confined to the interlobular spaces, which accordingly appeared as broad lines circumscribing the lighter-colored lobes, with which they contrasted strongly in color because of their dark blood-stained exudate. Even when the lobules were also the seat of exudation, they were mostly lighter than the interlobular spaces, in this differing from the ordinary inflammation of the lungs, in which the latter appear as yellow lines. The bronchia of the affected lobules were invariably filled with a frothy mucus, while in eight subjects they contained numerous lung-worms (*Strongylus elongatus*). It is worthy of notice that in nearly all cases in which lung-worms were found, the lobules into which the exudate had taken place were invariably connected with the infested bronchia. In one case the windpipe presented along its whole length a yellowish-white false membrane similar to that described as existing on the large intestine. In another instance a blocked bronchium presented a small circular slough not unlike the commencing slough of the intestinal mucous membrane. In no case did I meet with the caseous blocking of the bronchia recorded by Klein.

In one case only was there extensive liquid effusion into the pleuræ. This was of a dark blood color, and, besides, the blood-globules contained myriads of actively-moving bacteria. False membranes of recent formation also connected the pulmonic to the phrenic pleuræ in this case. The right lung was hepatized throughout. In the same subject the pericardium was the seat of a similar exudate, and fibrinous coagula connected the cardiac to the mediastinal layer. In three cases the lining membrane of the heart was the seat of spots of ecchymosis, by preference on the papillary muscles. The right heart usually contained a clot of blood which showed a buffy coat in three cases only. In two cases there was a clear translucent exudation around the auricle ventricular furrow, which, under the microscope, showed fat cells and granules, and a network of capillary vessels in which the blood-globules moved freely, and showed no tendency to adhere.

Brain.—In one case there were four hæmorrhagic spots on the dura-mater, averaging about one line in breadth.

MICROSCOPIC OBSERVATIONS.

Skin.—Microscopic sections through the affected portions of skin showed the various grades of congestion; congestion with blocking of the capillaries, and excess of lymphoid and large granular cells and granules staining deeply with coloring agents; and congestion, with extravasation and the formation of necrotic spots. (See Plate IX, Fig. 1.) With the earlier congestion there is more or less dropsy of the skin and consequent separation of its intimate textures, while in the later or more severe conditions a fibrinous exudation takes place, and this may even exude from the surface and concreate there in dark scabs. In no instance did I meet with the formation of pus in the skin, and notwithstanding the numerous minute extravasations into the true skin and cuticle, in one case only was there sufficient destruction of a superficial vessel to lead to a temporary hæmorrhage. One feature which I have not seen mentioned by other observers is the implication of the bristle follicles. It has been already stated that the pink papular eruption is mostly ob-

served around the roots of the bristles, and it may be added that the bristles always stand erect and harsh. Moreover, in addition to the general unthriftness and scurfiness of the skin, it tends early to become coated with greasy exudation, resulting usually in the black concretion already mentioned and soluble in ether. This is manifestly a product of the hair follicles and their sebaceous glands, and accordingly a section through one of these shows the deep congestion of the capillary plexus. (See Plate IX, Fig. 2.)

Intestine.—Sections through those portions of the mucous membrane which are merely congested and reddened, but without ulceration, shows stagnation and blocking of the capillary vessels in the mucosa and sub-mucosa, with thickening and softening of the textures, and especially of the epithelial layer. This last contains a great excess of granules and aggregations of granules into cell forms (giant cells of Klein), while the epithelial cells themselves are reduced in size and contain enlarged nuclei. As formerly pointed out by Klein, the degeneration is often greatest around the openings of the crypts of Lieberkühn, and in their interior, while their cavities are not unfrequently filled with extravasated blood. Besides the above are found lymphoid and wandering blood cells, crystals of hæmatine and closely aggregated masses of granules staining deep purple blue in hæmatoxylin and insoluble in caustic potash—the micrococci of Klein. These last are especially abundant on the surface, but extend into the deeper fibrous layers as well. In severe cases the epithelial layer may be raised from the mucosa by a considerable dark-red clot, though the escape of blood in large amount is more frequent under the mucous membrane, so as to separate it from the muscular coat.

The ulcers with a central slough present at their base the same characters as the congested mucous membrane, as regards cellular and granular proliferation, blocking of vessels, exudation, and microscopic extravasation. The slough may be shown to be made up mainly of small nucleated cells and granules; but it retains under the microscope its close-laminated appearance, caused by the gradual extension in depth and breadth by the death of successive layers of the mucous membrane. It contains numerous groups of the granular bacteria already referred to, and extending down to its deepest strata.

Lymphatic glands.—As regards the lymphatic glands, I need only repeat the statement of Klein, that the blocking of vessels and extravasation of blood is most commonly into the outer or cortical portion alone; in the more severe forms in which the medullary part is also implicated, the blood effusion is often confined to the lymph-channels and the connective tissue-partitions, while the glandular cylinders escape. It is in cases of longer standing that the cell changes are the most marked. Then there may be found in the lymph-channels the giant cells already mentioned, and the groups of granular-looking micrococci, similar to those found in the intestinal ulcers, as well as lymph-cells of an abnormally dark granular aspect.

Organs of respiration.—The characteristic lesion of the lungs is lobular pneumonia, the exudation taking place most abundantly into the connective tissue between the lobules, and there assuming a dark color by reason of the abundant escape of blood-globules. On making a microscopic section across the smaller air tubes and air sacks, we find in the connective tissues generally, and in the walls of the alveoli and around the bronchia an exudation containing an excess of small round lymphoid cells and granules, and in the air cells themselves accumulations

of similar rounded cells (Klein's giant cells), granular matter, and clumps of granular bacteria.

In one instance the wind-pipe from larynx to lung had its superior wall covered by a yellowish-white diphtheritic-looking layer similar to that which I found on another occasion throughout nearly the whole large intestine. A section of this under the microscope showed mainly small rounded granular cells, Klein's large granular unilocular cells, and clusters of the granular masses of bacteria, staining deeply with hæmatoxylin. The liver sometimes showed congestion and blocking of its intralobular capillaries and an escape of small rounded granular cells (lymph) into the interlobular spaces, the latter affording a marked contrast to the redness in the center of the acini.

Kidneys.—These were, with one exception, pale in their cortical portion, and a cloudy swelling existed in the walls of the tubules. Spots of blood-staining were common on the papillæ, and at those points the capillaries were blocked by coagula to a greater or less extent.

Blood.—In most cases no alteration of the blood was detected. In one pig, however, on the second day before death, the blood swarmed with bacteria, showing very active movements. In the subjoined drawings (Plate XIII, Fig. 3) may be seen the various forms presented by one bacterium in a few minutes only. The blood of another pig, which had been inoculated from this one showed the same living germs in equal quantity. They were further found in the blood of a rabbit and sheep inoculated from the first-mentioned pig. In an abscess of a puppy which had also been inoculated the germs were abundant. The blood was not examined. In the blood of healthy pigs no such organisms were found. It may be added that the greatest precautions were taken to avoid the introduction of extraneous germs. The caustic potash employed was first fused, then placed with reboiled distilled water in a stoppered bottle that had been heated to a red heat. The glass slides and cover glasses were cleaned and burned, the skin of the animal cleaned and incised with a knife that had just been heated in the flame of a lamp, the caustic solution and the distilled water for the immersion lens were reboiled on each occasion before using, and finally the glass rods employed to lift the latter were superheated before being dipped in them. On different occasions when the animal was being killed I even received the blood from the flowing vessels beneath the skin into a capillary tube which had just been purified by burning in the flame of a lamp. With these precautions it might have been possible for one or two bacteria to get in from the atmosphere, but not for the swarms I found as soon as the blood was placed under the microscope.

PARASITIC WORMS.

In view of the fact that the swine-fever has been repeatedly ascribed to the ravages of worms, it may be well to notice specially those that were found in the pigs subjected to experiment.

Strongylus elongatus (Dry.), *Paradoxus* (Mehlis), *Lung-worm*.—The first eight pigs were purchased of a butcher, and had been fed on offal from his slaughter-house. The lungs of all these contained these worms in numbers varying from ten to forty full-grown specimens, and one pig died, apparently from this cause, on the seventh day. The worms were mostly found in the terminal part of the main bronchium in the posterior lobe of one or both lungs. Others of the air-tubes were, however, occasionally infested. The infested tubes were filled with a glairy mucus, rendering them totally impervious to air, and containing the

white thread-like worms and myriads of microscopic eggs. In every case the lobules to which such obstructed air-tubes led were red, congested, and solid, or, as in one or two instances, dropsical, and of a slightly translucent, grayish color. Sections of the diseased portion showed the air-cells partially filled with an exudate in which small rounded cell-forms predominated. The walls of the air-cells were the seat of congested and blocked capillaries and granular cells, while in most cases there were superadded the more specific characters of the fever—the presence of the worms and their irritation having evidently determined the lesions of the specific fever to the infested lobules.

The worms may be thus shortly described: Head slightly conical; mouth terminal, small, circular, with three papillæ; body like a stout thread, white or brownish, skin nonstriated; œsophagus short, 0.63 millimeters, enlarged posteriorly, club-shaped (Plate XIII, Fig. 4); intestine slightly sinuous, and longer than the body; anus opening on a papilla a little in front of the tail. *Male*, 8 to 9 lines in length; tail curved, furnished with a bilobed membranous pouch supported by five rays, two of them double, and two long delicate spiculæ with transverse markings (see Plate XIII, Fig. 5). *Female*, 1 to 1½ inches long; tail turned to one side, narrowing suddenly to be prolonged as a short, curved, conical point; genital orifice in the anterior half of the body, yet close to the middle; oviducts very much convoluted. The *ora* are slightly ovoid $\frac{5}{8} \times \frac{1}{16}$ inch in diameter, and appear as if they filled the entire body of the adult female (see Plate XIV, Figs. 6, 7, and 8).

Habits.—Like other *strongyli*, these worms attain sexual maturity in the body of their host, and they lay their eggs in the bronchia, to be carried out in all probability and hatched in pools of water and moist earth. It is worthy of note that though I found in the bronchia and air cells eggs in all stages of segmentation, and those containing fully-formed embryos, I did not find a single free embryo worm. The presumption is that, like other closely related worms, they are only hatched out of the body, and that the microscopic embryos live for a variable length of time in water or moist earth, and on vegetables, to be taken in with these in feeding and drinking.

That these worms are injurious there can be no doubt. Pigs infested by them thrive badly, and many die, as did the poorest of my first experimental lot. Like all parasites, they multiply rapidly wherever their propagation is favored by the presence of large herds of swine, and especially if these are kept on the same range and water season after season. In such circumstances they will produce a veritable plague, proving especially destructive to the younger pigs. There is little doubt that many outbreaks of alleged hog-cholera, in which the lungs alone are affected, are but instances of the ravages of these lung-worms, but that they are the cause of the specific fever which we are investigating is negated by the complete absence of these worms in all of my second experimental lot.

Tricocephalus Dispai (Creplin) *Whip-Worm of Swine*.—This I found in large numbers in the cæcum and colon of the experimental pigs, and especially of the first lot—those that had been fed on raw offal. This worm is characterized by a long, delicate, filiform anterior part of the body, and a short, thick, posterior portion. The narrow portion is 0.02 millimeters broad and exceedingly retractile; the posterior portion may be almost 1 millimeter thick. The tegument is very finely striated across, and has a longitudinal papillated band. The œsophagus is very wide and slightly tortuous. The *male* is about 1½ inches long but the thick portion does not much exceed ½ inch, and is curved in a spiral. The

SWINE FEVER.

Report Commissioner of Agriculture for 1878.

Plate XIII.

Forms assumed in rapid succession by bacterium; also head and tail of lung worm.



Fig. 3. Forms assumed in rapid succession by a bacterium from the blood of a sick pig. $\times 1000$.

Fig. 4. Head of Lung Worm.
Strongylus Elongatus.

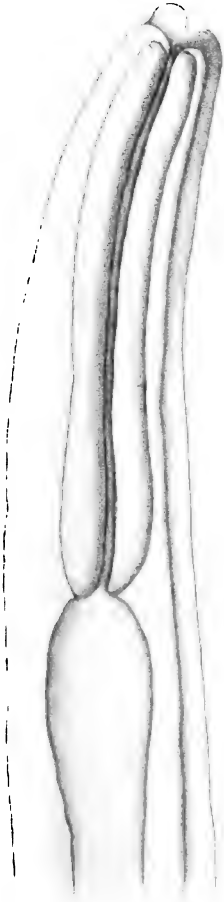


Fig. 5. Tail of Male
Strongylus Elongatus.



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spiculum measures about 1 line, and is furnished with a funnel-shaped membranous sheath. The *female* is $1\frac{1}{2}$ to 2 inches in length, the thick portion varying from $\frac{1}{2}$ to $\frac{3}{4}$ of an inch. The posterior portion is brownish, filled with eggs, and ends in a blunt point. The *ova* are 0.052 millimeters in diameter, with a transparent button-like prolongation at each pole.

Like as with other round worms, the *ova* are laid in the body of the host, but passing out are hatched in water, &c., the young spending their early life in pools, streams, &c., and gain access to the body in food and drink. The worm we are at present considering is especially injurious because of its infesting the human being as well as the pig. Living in the large intestine, it bores its head and much of its anterior filiform body deeply ($\frac{1}{4}$ inch) into the mucous membrane and sucks the blood. When present in large numbers it determines active inflammation of the large intestines, with costiveness or diarrhea, and a rapidly-advancing bloodlessness. Inasmuch as the seat of its ravages, the cæcum and colon, is specially obnoxious to the lesions of the true hog-fever, epizootics caused by the undue prevalence of these worms are very liable to be confounded with the latter disease. The worms are so small that they are easily overlooked among the solid contents of the viscera, unless special care is exercised in the search.

Sclerostomum dentatum (Diesing).—This is another small worm of the cæcum and colon of pigs, found on one occasion only in my experimental animals. It varies from $\frac{1}{8}$ to $\frac{1}{2}$ inch in length and is about $\frac{1}{8}$ line in thickness, hence perhaps more easily overlooked than is the whip-worm, but no less injurious. The body is of a dark gray, brown, or black, according to its contents; the tegument covered with very fine transverse striæ; head broad, mouth terminal, round, and furnished with six very sharp horny teeth, with which to penetrate the mucous membrane. The gullet is broad and club-shaped, and furnished with two salivary glands, opening by delicate canals into the mouth. Intestine wide and sinuous. *Male*, $\frac{1}{8}$ inch long, $\frac{1}{16}$ inch in thickness; tail furnished with a bell-shaped membranous expansion, supported by three rays, but open on one side. Testicle single and extended in a sinuous manner from near the gullet to the tail. Two delicate spiculæ. *Female*, 4 to 5 lines in length, tail slowly narrowed and terminated abruptly with a sharp projecting point. Ovaries very tortuous, extend from near the gullet to the tail, where they end in a globular enlargement, beneath which, and close to the point of the tail, is the vulva. The ovoid eggs are laid in the intestines, and carried out with the dung, in which they will hatch, and give exit to the embryo worms on the third day. Like all this family of round-mouthed worms, this fixes itself to the mucous membrane by its mouth, penetrates the tissues with its sharp teeth, and lives upon the blood. If present in large numbers it may establish such a drain that the host becomes pale and bloodless, rapidly loses condition, and perishes from anæmia. It will also, like the whip-worm, irritate the bowels and bring on fatal inflammation, with constipation or diarrhea. In both cases alike the lesions are in the cæcum and colon, the common seat of ulceration, &c., in the specific fever; hence the epizootic is liable to be set down as hog-cholera. It should be added that some members of the family of *Sclerostomata*, and notably the *Sclerostomum equinum* (*Sclerostomum* of the horse), pass a portion of their early life encysted in the mucous membrane and even in other internal organs, and there is some reason to suppose that the *Sclerostomum* of the pig has similar habits, which add materially to the irritation caused by its presence in large numbers. The pigs in Virginia reputed as dying from hog-cholera, caused

by microscopic worms in the walls of the bowels, were, in all probability, the victims of an epizootic of *Sclerostomata*.

That the genuine hog-fever is not caused by either of these worms is best illustrated by the fact that in my second lot I found very few whipworms and no *Sclerostomata*, though both were diligently sought for.

Cysticercus Zemicollis.—This *hydatid* I found in considerable numbers in the abdominal cavity (in the omentum, peritoneum, liver, kidneys, &c.), in the pelvis, perineum, and pleuræ of my first lot of pigs. It consists of an ovoid bag of liquid $\frac{1}{2}$ to 1 inch in length, with an opening at one end, through which the head is drawn back into the sack. The head is supported on a very attenuated thread-like neck, whence the name. The membrane of the sack is marked by fine transverse striæ, and if placed in tepid water will often undergo active contractions, during which the head can be seen to rise and fall in the interior. The head and neck contain an abundance of dark calcareous particles, soluble with effervescence in a strong acid.

Seventeen of these *hydatids* were fed to a Newfoundland puppy, fresh from its mother, ten having been kept for some time in a solution of common salt, while seven were fresh from a newly-killed pig. After twenty-five days the puppy was sacrificed, and seven tapeworms (*Tænia Marginata*) were found attached by their hooked snouts to the mucous membrane of the jejunum. Exposure to a strong solution of common salt for less than a week in some cases had been sufficient to destroy the first ten, while all the seven cysticerci, grown fresh, developed into tapeworms. These had the globular head with four sucking disks and retractile proboscis, surrounded by a double row of 36 hooklets, having the characteristic long posterior process as shown in the accompanying lithograph (Plate XIV, Figs. 9 and 10); also the calcareous markings in the head and neck already referred to.

It is well known that when several ripe segments of this tapeworm are given to a sheep or goat, the myriads of resulting embryo worms that bore their way into the liver and other organs will give rise to such destructive changes in them that death may ensue in ten days. But here again we have the counter evidence in the entire absence of these parasites in my later lot of pigs, showing that they were in no way responsible for the specific hog-fever.

Other parasitic worms of swine.—It is needless to open up the question of the causation of this disease by the other worms of swine. Many years ago Dr. Fletcher called attention to the destructive effects of the *lard worm*—*Stephanurus Dentatus*—(misnamed *Sclerostoma Pinguicula*) on the liver and other internal organs, and even attributed the hog-cholera to its ravages. Doubtless he was dealing with an epizootic of this worm, but in many instances since, as in my own recent cases, this worm has been sought for in vain.

So with the *Trichina Spiralis*, the *Hook-headed Worm* (*Echinorhynchus Gigas*), the common measles *hydatid* (*Cysticercus Cellulosa*), and the liver flukes (*Fasciola Hepatica*, and *Distomum Lanciolatum*); however destructive they may be to pigs in infested localities, their entire absence in my experimental pigs sufficiently excludes them from the causation of the specific hog-fever.

EXPERIMENTS ON THE PROPAGATION OF THE DISEASE BY INOCULATION AND OTHERWISE.

Virulence of dried virus.—In experimenting on the hogs it was sought, first, to ascertain the tenacity of life of the dried virus. This was indi-

SWINE FEVER.

Report Commissioner of Agriculture for 1878.

Plate XIV.

Ova, hooks, and head and tail of lung worms.

Fig 8. Head of Female *Strongylus Elongatus*.

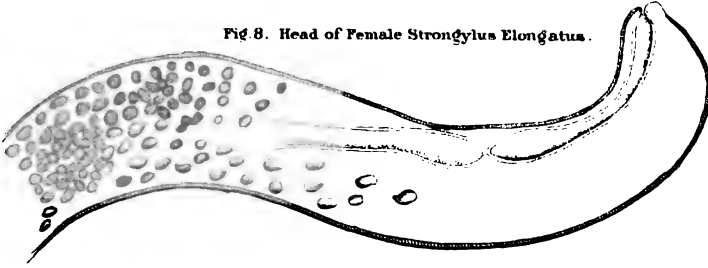


Fig 6. Tail of Female *Strongylus Elongatus*.

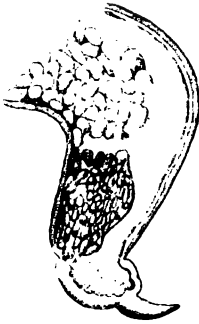


Fig 7. Ova of *Strongylus Elongatus*.

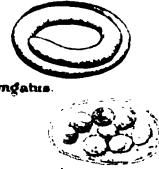


Fig.10 Long and Short hooks of *Taenia marginata* x 240.



Fig.9. Head of *Taenia marginata* x 50.





cated three years ago by Professor Axe, who successfully inoculated a pig with virus that had remained dried upon ivory points for twenty-six days. It seemed important to test this by further experiment, as upon this question depends the weighty one of arresting or putting an end to the plague by the extinction of its poison.

Three pigs were inoculated with virulent products that had been dried on quills for ONE DAY, one with virus dried on the quill for FOUR DAYS, one for FIVE DAYS, and one for SIX DAYS. The quills had been sent from New Jersey and North Carolina, wrapped in a simple paper covering, and therefore not in any way specially protected against the action of the air. Of the six inoculations, four took effect, and in the two exceptional cases the quills had been treated with disinfectants before inoculation, so that the failure was to be expected.

Virulence of the dried intestine.—In the case of the quills, the virus was dried quickly on account of the tenuity of the layer, and no time was allowed for decomposition. With the diseased intestine the drying in the free air and sun was necessarily slower, and more time was allowed for septic changes. Three pigs were inoculated with diseased intestine which had been dried for THREE and FOUR DAYS respectively. In one case the diseased product was from North Carolina. In all three cases the inoculation proved successful. The morbid product, therefore, even in comparatively thick layers, may dry spontaneously, so as to be the means of transmitting the disease to the most distant States.

Virulence of the moist morbid product if secluded from the air.—A pig was inoculated with a portion of diseased intestine sent from Illinois in a closely corked bottle. The inoculating material had been THREE DAYS from the pig and smelt slightly putrid. The disease developed on the sixth day.

A second pig was inoculated with blood from a diseased pig that had been kept for eleven days at 100° Fahrenheit in an isolation apparatus, the outlets of which were plugged with cotton wool. Illness supervened in twenty-four hours.

The exclusion of air, or more probably the prevention or retardation of putrefaction, therefore, probably favors the longer preservation of the poison.

Probable non-virulence of morbid products that have undergone putrefaction.—Two pigs were inoculated in one day with the elements of an ulcer from a portion of intestine sent from New Jersey in a box. The product was TWO DAYS from the pig and distinctly putrid. Neither seemed to suffer at any time.

A third pig was placed in a pen with a portion of the same diseased intestine, and some manure sent with it. The intestine disappeared after the second day, and was probably eaten, but the pig showed no evil effects.

It should be stated that each of these pigs had been formerly inoculated, and two appeared to pass through a mild form of the disease, while the third had showed an elevated temperature on three alternate days only. It may therefore be questioned whether they had not attained to a certain degree of insusceptibility which insured the negative results. In other cases, however, I have found a second inoculation to take though the first had been successful, and Dr. Osler records cases of the same kind. The results obtained in the three above-mentioned pigs would demand further investigation in this direction, as they suggest a probable explanation of any varying virulence of the disease in wet and dry seasons, in sheds and in the fields.

If we can accept Dr. Klein's theory of the bacillar origin of the disease,

the harmless nature of thoroughly putrid products may be explained on the known principle that in preserved or cultivated products the propagation of the septic bacteria leads to the disappearance of the infecting ones.

Virulence of the blood.—A solitary experiment of Dr. Klein's having appeared to support the idea that the blood was non-virulent, I tested the matter by inoculating two pigs with the blood of one that had been sick for nine days. They sickened on the seventh and eighth days respectively, and from one of these the disease was still further propagated by inoculating the blood on three other animals as recorded below. It may, however, still be questioned whether the blood is virulent at all stages, as in the animals infected in the above experiments it was found to contain numerous actively moving bacteria, which had not been found in certain of the milder cases. This subject demands further inquiry.

Infection through the air.—Only one experiment was instituted on this subject. A healthy pig placed in a pen between two infected ones, and with the ventilating orifices within a foot of each other front and back, had an elevated temperature on the ninth, tenth, and eleventh days, with lameness in the right shoulder, evidently rheumatic. On the twenty-fourth day the temperature rose 2° , and remained 104° F. and upward for six days, when it slowly declined to the natural standard.

Infection of sheep, rabbit, and dog.—A merino wether, a tame rabbit, and a Newfoundland puppy were inoculated with blood and pleural fluid, containing numerous actively moving bacteria, taken from the right ventricle and pleura of a pig that had died the same morning. Next day the temperature of all three was elevated. In the puppy it became normal on the third day, but on the eighth day a large abscess formed in the seat of inoculation and burst. The rabbit had elevated temperature for eight days, lost appetite, became weak, and purged, and its blood contained myriads of the characteristic moving bacteria. The wether had his temperature raised for an equal length of time, and had bacteria in his blood, though not so abundantly. He did not seem to suffer materially in appetite or general health. The sheep and rabbit had been each unsuccessfully inoculated on two former occasions, with the blood of sick pigs, in which no moving bacteria had been detected. It remains to be seen whether the virus can be conveyed back to the pig and with what effect. Should further experiment show that other domestic animals than swine are subject to a mild form of the disease, and capable of thus conveying it and transmitting it with fatal effect to pigs at a distance, it will be a matter for the gravest consideration in all attempts to limit the spread of the malady or to secure its extinction. (Since the above was written, I have noticed that Dr. Klein has succeeded in transmitting the disease to rabbits, guinea-pigs, and mice.)

Results of disinfection and inoculation of diseased products.—Under this head eight experiments were conducted with as many different disinfectants, the morbid products being in every case such as had proved successful by direct inoculation on other swine. The object being to test first the most available and least expensive of the disinfectants, the virulent matters were treated with $\frac{1}{2}$ per cent. solution of each of the following agents: Bisulphite of soda, carbolic acid, sulphate of iron, chloride of zinc, and chloride of lime. The materials to be inoculated were in the thinnest layers, in four cases upon quills and in two in thin sections to be inserted under the skin. They were kept in contact with the disinfectants for five minutes, so that the virulent material was

thoroughly moistened, softened, and partially dissolved in the five cases in which a solution was used. In the sixth case the thin slice was only kept in the fumes of the burning sulphur for five minutes. In all cases a portion of the disinfectant was necessarily introduced into the wound along with the virulent agent. In four out of the six pigs the disease developed and ran its course as shown in the table, the disinfectants thus proving ineffectual being carbolic acid, sulphate of iron, sulphurous acid, and chloride of lime.

The pig inoculated with virus, treated with bisulphite of soda, died on the seventh day, evidently from lung-worms, and without any distinct symptoms of the plague. There remains the possibility that had it lived longer these would have appeared.

One agent only out of the six can be set down as having proved an efficient disinfectant as used, namely, the chloride of zinc. The virus, treated with this agent, produced no appreciable illness; and though the pig's temperature was raised on the fourth, sixth, and ninth days, this was probably accidental, as it showed no tendency to become permanent. Finally, two pigs were subjected to a hypodermic injection of a few drops of the blood of a diseased subject, mixed in a dram of a solution of permanganate of potassa for the one, and of bromide of ammonium for the other. Both inoculations took effect, and one of the pigs thus infected furnished the blood which conveyed disease to the sheep, rabbit, and dog, as recorded above.

NATURE OF THE HOG FEVER.

Though long confounded with *typhoid fever*, *anthrax* (*malignant pustule*), *erysipelas*, *measles*, *scarlatina*, &c., this malady is distinct from all of them. In my report for 1875 I pointed out my reasons for declining to recognize in it either of the above maladies, and claiming it to be "a disease *sui generis*"; and this position has been fully indorsed by the recent researches of Klein, Osler, and others, as well as by my own experiments. This affection may be defined as a specific, contagious fever of swine, characterized by a high but variable temperature, by congestion, exudation, ecchymosis, and ulceration of the intestinal mucous membrane, especially that of the cæcum and colon, and, to a less extent, of the stomach; by congestions and exudations in the lungs in the form of lobular pneumonia; by general heat and redness of the skin, the latter effaceable by pressure; by darker red and black spots unaffected by pressure; by a papular eruption and abundant dark sebaceous exudation; by ecchymosis on the mucous and serous membranes generally; by swelling and ecchymosis of the lymphatic glands; by irregularity of the bowels, costiveness alternating with a fetid diarrhea; and perhaps most important of all, by the presence of colonies of minute globular micrococci in the various seats of morbid change.

An experiment of Dr. Klein, in 1877, in which he cultivated the micrococcus for seven successive generations in the aqueous humor taken from the eyes of rabbits, using only a speck on the point of a needle to inoculate every new portion of the humor, and finally inoculated the product of the fifth and seventh generations successfully on two pigs, seems to establish that these microphytes are the ultimate cause of the disease. My own experiment, in which the disease was conveyed by blood that had been kept for eleven days in an incubator at the temperature of the body, goes to support the same conclusion; but I hope still to subject this question to a more crucial test. If we accept this hypothesis of the pathogenic action of the bacteria, it would almost of necessity follow

that the blood, the channel through which these must be carried to the various organs in which they are found, must prove virulent. One of Dr. Klein's experiments appears to negative this conclusion, whereas three of mine go to support it. From what we know of the generation of microphytes, it seems not improbable that at certain stages of its development this specimen may fail to be injurious, or more probably the germs may be filtered from the blood, being arrested in the capillaries, where they determine the morbid changes, and thus many specimens of blood may be obtained which are destitute of the morbid element, until that is again produced in abundance by proliferation in the tissues. By reference to my experiments, it will be seen that the blood with which the successful inoculations were made was taken from pigs in the last stage of the disease, or just after death. That the blood is virulent at certain stages is unquestionable, and in the nature of things this can scarcely fail to be the case, even if we were to set aside experiments and reach our decision from the lesions alone.

CAUSES.

It has been no part of my purpose to investigate the causes of this disease apart from the one specific cause of contagion. It was indeed impossible to pursue such a line of inquiry at a distance from any district where hogs are largely raised, where the disease prevails extensively, and where, presumably, new generations of the poison are taking place. One instance, however, of probable generation *de novo* has been brought under my notice, and the attendant circumstances were such that I think it important to publish the principal facts. In the end of April, 1871, Colonel Hoffmann, of Horseheads, purchased a large herd of swine to consume the buttermilk of his creamery. The swine were supplied with sheds, the open range of an orchard, with plenty of shade under the trees, on a gravelly soil, rising abruptly 10 to 15 feet above the general level of the valley, and were fed fresh buttermilk and corn meal. All went well until late in June or early in July, when the hogs began to sicken and died in large numbers, with the general symptoms of the hog fever. I have mentioned this mainly to negative the widespread belief that the source of the trouble is in the exclusive feeding upon corn. Here we had a laxative and otherwise model diet, supplemented only to a slight extent by corn. It may be well to state that in other years, when he has purchased Western hogs, the disease has always appeared within ten days or a fortnight after their arrival. When New York State hogs only have been bought the pestilence has not broken out.

In view of the strong assertions that pigs will not contract the disease when fed in part on green food or on succulent vegetables—turnips, beets, potatoes, apples, &c.—I had some subjects of experiment freely supplied with potatoes and apples, but whenever the poison was introduced by inoculation I could detect no difference in the period of incubation or the severity of the attack.

It may be added that all unwholesome conditions of feeding and management will favor the development of this as of other specific fevers, by deranging the nutrition, disturbing the balance of waste and repair, loading the blood and tissues with effete and abnormal products, raising the body temperature, and on the whole bringing about a state of the system extremely favorable to the propagation and growth of disease germs. But while the importance of all these may be recog-

nized as accessories, we must not allow them to withdraw our attention from the one condition essential to the development and propagation of the malady—the presence of the specific poison. To quote from my report of 1875, “The important point is this: We know this is a contagious affection, to the propagation of which all possible insalubrious conditions contribute. So soon as we concentrate our attention on this point we have the key to its prevention, if not to its entire extinction.”

IS THE TREATMENT OF HOG FEVER GOOD POLICY?

In taking what I know to be an unpopular position on this subject, I am led by the strongest convictions of duty. I well know how popular would be an investigation into the curative powers of different systems, and even nostrums, in this disease, and how many breeders and dealers in swine will readily spend more than the value of the sick hog in the purchase of boasted specifics, to say nothing of the cost of attendance, and how they will rejoice over the wretched unthrifty animal whose life is at times preserved. It is not that recovery is impossible. A certain proportion, 20, 50, or even 80 per cent., will often survive. In my experimental cases only 21 per cent. died and over 28 per cent. recovered from the first attack, so that they were used for further experiment, and this without any attempt at medication or treatment further than wholesome food, cleanliness, and disinfection of the pens. I am convinced that a still better showing could be made in the majority of cases if the sick animals were submitted to careful and intelligent medical treatment.

Were the question of the preservation of the infected pig the only one or the main one to be considered, I would strongly advocate medicinal treatment. But the question is rather one of comparison between this one sick hog or herd and all the healthy swine in the same town, county, State, or nation. This is not a question of morality, but a problem in political economy, and when dealt with by a government must be decided on the ground of what is best for the whole nation. If, then, the preservation and treatment of a single sick hog means the incessant and incalculable increase in its body and secretions of a poison which is in the last degree deadly to other hogs; if this poison can be dried and preserved for a length of time, and carried meanwhile to a distance of a thousand miles, and if not hogs alone but sheep, guinea-pigs, and even wild animals like rabbits and mice, can contract the disease and convey the poison to any distance in their bodies, then the best interests of the nation demand that the sick animal shall not be preserved, but promptly sacrificed to the good of the community.

This point is so important that I may be permitted to dwell on it a little further. Some of my experimental pigs were successfully inoculated with quills that had been dipped in the morbid exudations of sick pigs in New Jersey and North Carolina, and had been dried and preserved for from one to six days in this condition. Here we had the thinnest possible film, such as might have adhered to the clothing of man, the hair of an animal, the feet or bill of a bird, the legs or prehensile organs of an insect, to a dried leaf, or even to a floating thistle-down, and might have been thus carried in a great many different ways to infect distant herds. What was actually conveyed some hundred miles on a dried quill, and preserved its virulence for six days in this condition, can be as certainly preserved on any other dry object, and if brought by

accident in contact with a raw surface, will produce disease as surely as did the quills in my inoculations. My own observations in this respect have been more than corroborated by one of Professor Axe, of the Royal Veterinary College, London. He produced the disease by inoculating from ivory points on which the cutaneous exudation had been dried up for the long period of twenty-six days.

That the poison can be preserved even in the liquid state when the germs of putrefaction are excluded, may be inferred from my successful inoculations with blood that had been kept in an isolation apparatus, at the ordinary body temperature, for the period of eleven days. As directly to the point is the cultivation of the poison in aqueous humor for seven days, by Klein, and its subsequent successful inoculation. This experiment of Klein is, however, possessed of vastly greater importance, inasmuch as by it it was first shown that the poison can be cultivated and indefinitely increased out of the animal body as well as in it. On seven successive days he inoculated seven successive portions of aqueous humor with as much of the inoculated liquid of the previous day as would adhere to the point of a needle, the first having been similarly inoculated from the sick pig. From the cultivations of the fifth and seventh days, respectively, a drop was taken and two pigs were successfully inoculated therewith. In the cultivation of each day were found myriads of *bacillus*, but no other organization, and thus Klein was the first to show that the *bacillus* is the probable cause of the disease. Had there been no reproduction and increase of the poison, it must have been rendered inconceivably dilute, an approximate ratio of the poison added to the first day's cultivation, and that added to the last, being about as 1 is to 1,000,000,000,000,000,000. That such a dilution could be operative seems utterly incredible, and as modern research shows that virulence resides not in simple liquids, but in the solid particles contained in them, and as the only definite organisms in the cultivation liquids were the *bacilli*, it seems inevitable that these are the active cause of the disease. But if so, they cannot only be preserved, but increased in suitable fluids outside the animal body. It is true they disappear when the active organisms of ordinary putrefaction (*bacterium termo*) become numerous, but they are not necessarily destroyed. From what we know of the life of these mycophytes it is to be feared that so far as the *bacillus* has advanced to the production of spores, it will be preserved in a dormant state, like so many dried seeds, until conditions favorable to its growth shall transpire. On the other hand it may be recollected that my attempts to propagate the disease from a putrefying bowel failed, so that further observation is wanted before we can say that the *bacillus* or its spores are preserved in a septic liquid. However that may be, the possibility of its increase in a non-septic normal fluid is an additional argument for the total destruction of all diseased pigs and morbid products.

In the case of high-priced pigs, where expense is no object, and where the patients can be kept in thoroughly disinfected pens, under the most rigid seclusion, treatment may sometimes be commendable; but in the case of common herds, and as viewed from the standpoint of the greatest good to the greatest number, there can be no question at all that the treatment of the sick is the most ruinous policy, while the most stringent measures for the extinction of the poison is the only economical one. The universal experience of veterinarians supports this conclusion, and nearly every European government has now reached the same conviction, and absolutely prevent the preservation and treatment of the victims of those fatal contagious diseases which most threaten their flocks and herds.

MEASURES TO ARREST AND EXTIRPATE THE DISEASE.

To put a stop to the ravages of the fever concerted measures are essential. One farmer may easily eradicate it from his own herds; but so long as his neighbors continue to harbor it his stock is daily subjected to the danger of renewed infection. His personal sacrifice is all in vain, so long as he is liable to have his herds infected by a chance visitor, a wandering animal or bird, or even a favorable wind. What is true of the individual farmer is equally true of the township, county, and State. One may crush out the disease at a cost of immense effort and outlay only to find it reappearing the next day, as the result of carelessness on the part of an adjoining or even distant State or district. In our Eastern States this plague is almost invariably the result of importation, and though from the lack of pigs it never gains a wide prevalence, it sufficiently illustrates how the disease is propagated in the West, where its more extended ravages are liable to blind the eyes to the fact. To secure a complete or even partial immunity active measures must be taken over the entire land, and while this cannot be done by States, districts, counties, or even towns, separately, it will be rendered the more effectual in the precise ratio that it is inaugurated as a uniform system over the entire country, and under one central controlling authority.

Without entering at this time into all the details of the necessary restrictive measures, the following may be especially mentioned: 1st. The appointment of a local authority and inspector to carry out the measures for the suppression of the disease. 2d. The injunction on all having the ownership or care of hogs, and upon all who may be called upon to advise concerning the same, or to treat them, to make known to such local authority all cases of real or suspected hog fever, under a penalty for every neglect of such injunction. 3d. The obligation of the local authority, under advice of a competent veterinary inspector, to see to the destruction of all pigs suffering from the plague, their deep burial in a secluded place, and the thorough disinfection of the premises, utensils, and persons. 4th. The thorough seclusion of all domestic animals that have been in contact with the sick pigs, and in the case of sheep and rabbits the destruction of the sick when this shall appear necessary. 5th. Unless, where all the pigs in the infected herd have been destroyed, the remainder should be placed on a register and examined daily by the inspector, so that the sick may be taken out and slaughtered on the appearance of the first signs of illness. 6th. Sheep and rabbits that have been in contact with the sick herd should also be registered, and any removal of such should be prohibited until one month after the last sick animal shall have been disposed of. 7th. All animals and birds, wild and tame, and all persons except those employed in the work, should be most carefully excluded from infected premises until these have been disinfected and can be considered safe. 8th. The losses sustained by the necessary slaughter of hogs should be made good to the owner to the extent of not more than two-thirds of the real value as assessed by competent and disinterested parties. 9th. Such reimbursement should be forfeited when an owner fails to notify the proper authorities of the existence of the disease, or to assist in carrying out the measures necessary for its suppression. 10th. A register should be drawn up of all pigs present on farms within a given area around the infected herd—say, one mile—and no removal of such animals should be allowed until the disease has been definitely suppressed, unless such removal is made by special license granted by the local authority after they have assured themselves by the examination of an expert that the

animals to be moved are sound and out of a healthy herd. 11th. Railroad and shipping agents at adjoining stations should be forbidden to ship pigs, excepting under license of the local authority, until the plague has been suppressed in the district. 12th. When infected pigs have been sent by rail, boat, or other mode of conveyance, measures should be taken to insure the thorough disinfection of such cars or conveyances, as well as the banks, docks, yards, and other places in or on which the diseased animals may have been turned.

Other measures would be essential in particular localities. Thus in the many places where the hogs are turned out as street scavengers and meet from all different localities, such liberty should be put a stop to whenever the disease appears in the district, and all hogs found at large should be rendered liable to summary seizure and destruction.

The great difficulty of putting in practice the means necessary to the extirpation of the disease will be found to consist in the lack of veterinary experts. No one but the accomplished veterinarian can be relied on to distinguish between the different communicable and destructive diseases of swine, and to adopt the measures necessary to their suppression in the different cases. In illustration I need only recall the numerous reports in which what is supposed to be hog cholera has been found to depend on *lung worms*, on any one of the four different kinds of *intestinal round worms*, on the *lard-worm*, on *embryo tape-worms*, on *malignant anthrax*, on *pneumonia*, or on *erysipelas*. To class all these as one and apply to all the same suppressive measures would be a simple waste of the public money, but to distinguish them and apply the proper antidote to each over a wide extent of territory would demand a number of experts whom it would be no easy matter to find. This state of things is the natural result of a persistent neglect of veterinary sanitary science and medicine as a factor in the national well-being, and must for a time prove a heavy incubus on all concerted efforts to restrict and stamp out our animal plagues. It will retard success under the best devised system, and will sometimes lead to losses that might have been saved, yet if an earnest and prolonged effort is made the obstacle should not be an insuperable one, and the United States should be purged not of this plague only, but of all those animal pestilences which at present threaten our future well-being.

Respectfully submitted.

JAMES LAW.

ITHACA, N. Y., January 2, 1879.



SWINE FEVER.

Report Commissioner of Agriculture for 1878.

Plate .X



Microscopic section showing exudation in the caecal mucous membrane beneath an ulcer.



Microscopic section through skin, showing hair follicle containing effused blood. The bristle was detached in mounting.



SWINE FEVER.

Report Commissioner of Agriculture for 1878.

Plate XI.



Microscopic section of lung with exudate filling the air cells, and thickening the alveolar walls.



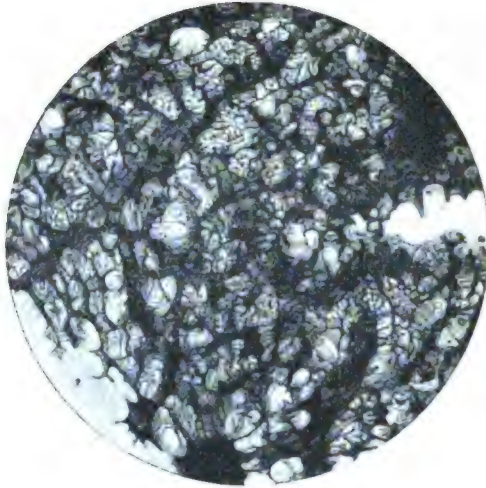
Microscopic section of congested gut, showing villi with excess of granular matter, stained in hematoxylin. Detached round cells.



SWINE FEVER.

Report Commissioner of Agriculture for 1878.

Plate XII.



Microscopic section of lung, showing thickened walls of air-cells; **blocked vessels**; exudate into cell-walls, and a few of the cells.



Microscopic section from ear, showing cartilage and skin with **broken surface**, and crust-entangling bristles.

APPENDIX.

RECORD OF EXPERIMENTS.—No. 1.

Male white pig, eight months old; no special breed. Formerly fed offal from a slaughter-house.

Date.	Hour.	Temperature of body.	Remarks.
Sept. 30	3 p. m.	104. 75° F.	Had escaped and was caught after a good chase.
Oct. 1	9 a. m.	103. 25	
1	6 p. m.	103. 5	Inoculated from quill charged with dried liquid from infected lung; matter from North Carolina, and five days old; quill dipped five minutes in solution of bisulphite of soda—: 1 :: 500.
2	9. 30 a. m. . .	102. 5	
3	9. 30 a. m. . .	102	
5	4 p. m.	102. 75	
6	5 p. m.	103. 25	
7	11 a. m.	100	
8	12 noon	101. 5	
9	11 a. m.	103. 5	
10	5 p. m.	101. 25	
11	10 a. m.	102	
12	4 p. m.	99	

Was found sprawling upon its belly unable to stand; breathing slow, deep, panting, and labored; snout hot, dry, and of a leaden color; ears and feet warm, bluish, but without any rash, eruption, blotches, or extravasations. Blood appears at the arms. An hour later this pig died.

Post-mortem examination thirty-six hours after death.—Body in excellent preservation; condition low; skin scurfy along the back; snout livid blue, but without petechiæ.

Digestive organs: Tongue has papillæ, at its base reddened; a similar blush appears on the fauces and pharynx.

Stomach and bowels normal.

Liver firm and sound. Kidneys and bladder sound.

Urethra (intrapelvic) deeply congested, almost black, but without any obstruction.

Parasites in abdomen: A few *tricocephali* (whip-worms) in the large intestines; a *hydatid* in the pelvic fascia.

Chest: Pleura normal; pericardium healthy, with a small quantity of serum.

Right heart: Auricle and ventricle filled with dark clotted blood.

Left heart: Auricle contains a small clot of black blood; ventricle empty.

Lungs: A great part of these is in a condition of carnification or infarction. This is confined to definite lobules or groups of lobules, the collapsed, red, fleshy aspect of which is in marked contrast with the full form and pale pinkish-white color of the remainder.

The air passages (bronchi and bronchia) contain small portions of the contents of the stomach which have been vomited up and drawn into the lungs in the last violent efforts to breathe. The air-passages leading to the collapsed lobules contain large quantities of a watery mucus and pellets of worms (*strongylus elongatus*) which completely block them. The obstructed terminal bronchia are dilated, and have their mucous membrane variously reddened and congested. Around these bronchia the connective tissue is strongly congested and filled with extravasated lymph, by which the vessels passing to and from the lobulets are compressed and obstructed. In view of this state of things, the explanation of the process of infarction in the lobules is easy; the irritation and congestion caused by the worms in the infested air-tubes extended to the surrounding connective tissue and the sheaths of the accompanying blood-vessels; the exudation of lymph compressed and obstructed the vessels, inducing stagnation, congestion, and exudation in the whole substance of the lobule or lobulets to which these led. Hence the invariable connection of the infarcted lobule, and the blocked, congested, and worm-infested tube that led to it.

EXPERIMENT No. 2.

White male pig, eight weeks old, smallest of litter. Formerly fed offal at a slaughter-house.

Date.	Hour.	Temperature of body.	Remarks.
Sept. 30	3 p. m.	104. ° F.	Has just come one mile in a wagon.
Oct. 1	9 a. m.	103.24	
1	6 p. m.	102.5	
2	9.30 a. m.	102.	
3	...do	101.	
5	4 p. m.	102.	
6	5 p. m.	101.	
7	11 a. m.	100.75	Bowels quite loose; rain.
8	12 noon	102.	Inoculated from quill dipped in liquids of diseased lungs forty-eight hours ago in New Jersey; quill treated with chloride of zinc before inoculating.
9	11 a. m.	101.	
10	5 p. m.	103.25	
11	10 a. m.	101.5	
12	4 p. m.	105.25	
13	12 noon	102.75	
14	4 p. m.	104.	
15	10 a. m.	102.5	
16	...do	102.5	
17	...do	104.	
18	...do	102.5	
19	...do	103.3	
20	...do	103.	Scouring; placed in pen with semi-putrid ulcerated intestine and manure of diseased pig.
21	...do	102.	
22	...do	102.5	
23	...do	102.75	
24	...do	103.	
25	...do	101.	
26	...do	102.75	
27	...do	101.	
28	...do	102.25	
29	9.30 a. m.	103.	
30	2 p. m.	100.5	
31	9 a. m.	102.5	
Nov. 1	10 a. m.	101.75	
3	9 a. m.	101.25	Inoculated with quill charged with liquid from lungs of pigs having no bowel lesions; sent from Indiana.
4	...do	102.	
5	9.30 a. m.	101.	
6	10 a. m.	100.5	
7	...do	103.	
8	...do	100.9	
9	...do	100.5	
10	...do	103.5	Pining; gets lighter daily.
11	...do	102.9	
12	...do	103.	Wasting, but lively.
13	...do	102.5	
14	...do	102.2	
15	...do	102.8	
16	...do	102.5	
17	...do	102.	
18	...do	100.5	
19	...do	103.	
20	...do	102.	
21	...do	102.	
22	...do	101.75	
23	...do	100.5	
24	...do	100.5	
25	...do	97.5	
26	...do	98.	Very weak and exhausted; surface cold; breathing slow and rattling; left its bed, but was unable to get back without assistance. An hour later breathing seemed to have ceased, but when removed for dissection it returned in a gasping manner; killed by bleeding.

Post-mortem examination.—*Skin:* Pale, bloodless, withered, and inelastic, covered almost universally with black concretions or unhealthy-looking and thick, dirty, white scurf. Snout beneath the nostrils blue, but not ecchymosed.

Digestive organs: Tongue healthy; beneath the right tonsil is a considerable collection of dirty, grayish-yellow, cheesy matter, consisting of pus-cells and much granular matter.

Stomach: Moderately full, contents fetid and slightly acid, firmly adherent to the mucous membrane, and bringing off part of the epithelium when detached. The mu-

cons membrane on the great curvature is congested, and bears several patches of deep, blood-red extravasation.

Small intestines: Red and congested throughout. The contents are small in quantity and dry, being collected in dry masses at considerable intervals, and partly frothy. The duodenum and first half of the jejunum contains twenty-two ascarides (*A. Suilla*), one extending to 11 inches in length. At different points the bowel is completely blocked by the rolls of these worms.

Large intestine: Ilio-cæcal valve normal. Cæcum and colon, like the small intestine, congested throughout nearly its whole extent, with patches of extravasation and erosion at intervals, but none of the characteristic sloughs nor ulcers, with thick indurated base. The cæcum and upper portion of the colon contains thirteen whip-worms (*Tricocephalus crenatus*), their heads firmly imbedded in the mucous membrane, and requiring considerable force to withdraw them.

Liver: Small and of healthy aspect. Gall-bladder full of a dark-green, tenacious bile. Spleen small, black, and somewhat soft. Pancreas normal. Mesenteric glands apparently little altered. Some were slightly congested.

Kidneys: Normal. In the prepulse is a slight, fetid, concretion-like false membrane.

On the omentum are two *hydatids*.

Respiratory organs: The whole interior of the larynx is of a dull brownish-red, excepting where covered by an extensive false membrane. Along the upper wall of the windpipe, where the ends of the cartilages overlap, is a false membrane about a third of an inch in breadth, and extending from the larynx as far as the lungs. This has a firm consistency, and a dirty yellowish-white color, tinged with green, and stands out prominently from the adjacent mucous membrane by an abrupt margin on each side. Under the microscope it is seen to consist of large quantities of granular matter, granule cells, epithelial and pus corpuscles, blood globules, and numerous crystals. It also contains eggs of the lung-worm beneath this morbid product.

Lungs: Whole anterior lobe of the right lung carnified, of a deep-red color, and sinks in water. The special bronchus for this lobe, and its divisions, are filled with a tenacious mucus, but contain no worms. Several lobulettes in the anterior lobe of the left lung are in a similar condition. On the posterior border of each lung several lobulettes are consolidated, being of a dirty-gray color and semi-transparent. They present, in short, the appearance of pulmonary oedema. The bronchia leading to these lobulettes are completely filled with a thick mucus and numerous worms (*strongylus elongatus*) and their eggs.

The bronchial lymphatic glands appear normal.

Blood: The blood is very black, coagulates slowly but firmly, and without buffy coat, and has its globules full-sized and rounded. The right side of the heart beat, when touched, for nearly five hours after the death of the animal, and of its removal from the body.

EXPERIMENT NO. 3.

White pig, eight weeks old; no special breed. Has been fed on raw offal at a slaughter-house

Date.	Hour.	Temperature of body.	Remarks.
Sept. 30	3 p. m.	103.5° F.	Has just come a mile in a box-wagon.
Oct. 1	9 a. m.	103	
2	6 p. m.	102.5	
3	9 a. m.	101.5	No observations.
4	.....do.....	101
5	4 p. m.	102.3	
6	5 p. m.	103	Blood taken from saphena vein for cultivation experiment; then inoculated with quill-point charged with liquid from diseased lung, five days old, from North Carolina.
7	11 a. m.	100.75	
8	12 noon	102.5	
9	11 a. m.	102.5	Slightly costive.
10	5 p. m.	103	
11	10 a. m.	103	
12	4 p. m.	104	Bowels natural.
13	12 noon	103	
14	4 p. m.	104.25	
15	10 a. m.	102.25	Dung very fetid.
16	.....do.....	101.5
17	.....do.....	103.25
18do.....	103	Inoculated with putrid intestinal ulcer from diseased pig in New Jersey. Fed a portion of same.
19	.....do.....	102.75
20	.....do.....	103
21do.....	100	
22	.....do.....	101.5
23	.....do.....	102.25

EXPERIMENT No. 3—Continued.

Date.	Hour.	Temperature of body.	Remarks.
Oct. 24	10 a. m.	101° F.	Appears to suffer from introduction of thermometer.
25	...do	102.5	
26	9 a. m.	100.5	
27	...do	101	
28	10 a. m.	101.5	
29	9.30 a. m.	100.75	
30	2 p. m.	102.25	
31	9 a. m.	102.5	No observations.
Nov. 1	10 a. m.	101.5	
2	...do .....	...
3	9 a. m.	100.25	Inoculated with dried diseased intestine sent from North Carolina. Dried in sun and air.
4	...do	101	Limited pink papular eruption on skin.
5	9.30 a. m.	101.75	
6	10 a. m.	101.75	
7	...do	103	
8	...do	102	
9	...do	100.5	
10	...do	104.5	
11	...do	102.5	
12	...do	102.5	
13	...do	103	
14	...do	103.6	
15	...do	103	
16	...do	103.5	
17	...do	103	
18	...do	103	
19	...do	103	
20	...do	102.5	
21	...do	101	
22	...do	102.5	
23	...do	102	
24	...do	101.5	
25	...do	102	
26	...do	103	
27	...do	104	
28	...do	104	
29	...do	101.75	
30	...do	Killed by bleeding.

Post-mortem examination.—*Skin*: The seat of some papular eruption and black incrustations, but without any patches of purple.

Digestive organs: Mouth and throat sound.

Stomach: Is mottled, of a dark brown along the great curvature, but without any extravasations or erosions.

Small intestines: Has several limited patches of slight congestion, but no erosions. It contains twenty *ascarides*.

Large intestines: Shows some slight congestions, but no slough, erosion, or ulcer. A dozen whip-worms are present in the cæcum and colon.

Mesenteric lymphatic glands: Generally healthy, but a few were unusually red and congested near to the congested patches of the small intestines.

Hydatids: The abdomen contains eight of these.

Liver: Firm and of nearly a natural appearance.

Spleen and pancreas: Sound.

Kidneys: Have cortical substance blanched, but are firm and apparently sound.

Lungs: Have some lobulets solidified red, impervious to air, and sinking in water. In the main terminal bronchia towards the posterior part of the lungs are numerous worms (*strongylus elongatus*), though not always in the air-tubes leading to the consolidated lobulets.

Heart: Sound.

Brain: Sound.

EXPERIMENT NO. 4.

White female pig, eight weeks old; no special breed. Formerly fed on raw offal at a slaughter-house.

Date.	Hour.	Temperature of body.	Remarks.
Sept. 30	3 p. m.	103.75 ° F.	Just come one mile in a wagon.
Oct. 1	9 a. m.	102.75	
1	6 p. m.	104	
2	9.30 a. m.	102	
3	do.	100.5	
5	4 p. m.	102.	
6	5 p. m.	101	
7	11 a. m.	103	Bowels quite loose. Inoculated with quill charged with lung-fluids of a pig that had died suddenly in New Jersey. Virus one day on quill.
8	12 noon.	101.5	
9	11 a. m.	102.5	
10	5 p. m.	104	
11	10 a. m.	102.75	
12	4 p. m.	104.5	
13	12 noon.	103	
14	4 p. m.	105.75	
15	10 a. m.	105	
16	do.	104.5	
17	do.	107	
18	do.	106	
19	do.	104.25	Scouring. Cold north gale, rain and frost. Do.
20	do.	105	
21	do.	105.25	
22	do.	104	Skin covered with purple and black spots with red areola. The cuticle or black spots is dead and easily separated.
23	do.	105.25	
24	do.	105.75	Extensive purple blotches on ears, flanks, and abdomen, and a pink rash one to two lines in diameter; appetite poor.
24	5 p. m.	105	
25	10 a. m.	106	Killed to-day by bleeding.

Post-mortem examination.—Has been purging; feces fetid and bright yellow.

Skin: Nearly covered with black spots of from one to two lines in diameter, and evidently formed by sloughs or small necrotic patches of cuticle, infiltrated with blood and dried up. The median line of the belly between the rows of teats is almost devoid of these spots.

A purple rash in spots averaging one line across exists in different parts of the body, but is most abundant on snout, ears, buttocks, root of tail, and limbs, especially on the lower parts and inner sides. At certain points, as on the pendant half of the ears, on the hocks, in the region of the arms, and on part of the snout, there is a uniform leaden discoloration. The inner sides of the arms have similar but more circumscribed patches.

Digestive organs: A deep purple blush extends along the line of papillæ on the right border of the tongue. Similar spots exist in the posterior nares. Salivary glands are pale and normal. The guttural lymphatic glands have spots of congestion on their surface, but not extending into their interior.

Abdomen: No effusion. Three *hydatids* are found attached respectively to the posterior surface of the stomach, to the back of the liver, and to the mesocolon.

Stomach: Full of undigested food, yellow at pylorus. No marked congestion nor softening. No parasites.

Small intestine: Duodenum without extra vascularity; its epithelium gray, pigmented, and easily detached. Jejunum and ileum had circumscribed spots of congestion one-half inch in diameter on an average, and in one case slightly eroded.

Large intestine: Cæcum presents three ulcers, each one-fourth inch in diameter, having a circular elevated mass of dirty-white deposit, apparently non-vascular, and a very slightly reddened base. The matter on the surface of the ulcer consisted of cells, round, angular, and of other forms, much granular matter and myriads of round and linear moving bacteria. None of these ulcers appear to be situated on the solitary glands. The same remark applies to the congestions and erosions of the small intestines. Colon and rectum natural.

Parasites: The small intestines contain three *ascarides* (*A. Suilla*). The colon contains a young whip-worm (*tricocephalus crenatus*). The coats of the intestines at the points of congestion and elsewhere were carefully examined for parasites, but without result. The muscular tissue of the diaphragm was also examined in vain.

Liver: Two small cysts, each one-half line in length, exist on the middle lobe. They had thick fibrous walls and liquid contents in which the microscope detected cell forms.

The general substance of the liver is firm and natural, a few acini only isolated and in groups, being congested. The color predominates in the center of the acinus. The liver cells are granular.

Gall-bladder: Is full, but not to excess, with bright yellow bile. The bile-ducts in the liver are also full.

Pancreas: Normal, pink. Pancreatic lymphatic gland blotched; deep red on the surface.

Kidneys: Normal, unless it be in extra pallor of the cortical substance.

Chest: Heart, right auricle and ventricle contain clots showing a buffy coat. Left auricle and ventricle empty. A few petechia exist on the septum ventriculorum.

Lungs: Petechia exist on the pleura. A number of lobulettes are solidified or infarcted, and of a deep red flesh color. The bronchia leading to such lobulettes are blocked by numerous worms (*strongylus elongatus*) and their eggs, embedded in an abundant tenacious transparent mucus. In some cases the bronchia appear dilated, the mucous membrane congested, and the epithelium degenerating, round and ovoid granular cells predominating in its structure. There is no visible stasis (coagulation) of blood in the capillaries of the bronchia. The worms are confined to the smaller bronchia, and are only exceptionally found in the otherwise sound portions of the lungs.

Blood: That from the gluteal vein contains no bacteria nor free hæmatine so far as can be detected. Red globules are crenated and shrunken.

EXPERIMENT No. 5.

Female white pig, eight weeks old, no special breed. Formerly kept on raw offal at a slaughter-house.

Date.	Hour.	Temperature of body.	Remarks.
Sept. 30	3 p. m.	103.75° F.	Just brought one mile in a wagon.
Oct. 1	9 a. m.	103.75	
1	6 p. m.	103	
2	9 a. m.	102	
3	9 a. m.	101.5	
5	4 p. m.	102.25	
6	5 p. m.	102	Inoculated with a quill dipped in liquids of diseased lung (five days old). Before the inoculation, quill was dipped ten seconds in solution of carbolic acid: 1 :: 500.
7	11 a. m.	103	
8	12 noon.	103.5	
9	11 a. m.	103.75	
10	5 p. m.	104	
11	10 a. m.	105	
11	5 p. m.	105	Bowels natural. Lively. Lively. Hungry.
12	4 p. m.	103.75	
13	12 noon.	104.3	
14	4 p. m.	102.25	
15	10 a. m.	104	
16	do	105	
17	do	104	Coughs. Bowels loose. Feces fetid. Scouring. Inoculated with substance of a firm intestinal ulcer, sent from New Jersey, and slightly putrid.
18	do	104.25	
19	do	103.75	
20	do	103	
21	do	102.75	
22	do	103.25	
23	do	103.75	A slight pink rash on skin.
24	do	103	
25	do	102.25	
26	9 a. m.	101	
27	do	102	
28	10 a. m.	103	
29	9.30 a. m.	102.75	Inoculated with intestinal mucus and ulcer from Illinois, very slightly putrid.
30	2 p. m.	103	
31	9 a. m.	103.75	
Nov. 1	10 a. m.	101.5	
3	9 a. m.	102	
4	do	100.75	
5	9.30 a. m.	101.5	
6	10 a. m.	101	
7	do	103.25	
8	do	102.5	
9	do	101	
10	do	104.75	
11	do	103.8	
12	do	102.75	
13	do	104	

EXPERIMENT NO. 5—Continued.

Date.	Hour.	Temperature of body.	Remarks.
Nov. 14	10 a. m.	104 ° F.	Shedding black scales, leaving red conical papules.
15	.....do.....	103.75	Abundant pink papular eruption, excessive between the thighs.
16	.....do.....	103.8	
17	.....do.....	104	
18	.....do.....	104	
19	.....do.....	104	
20	.....do.....	103.75	
21	.....do.....	103.2	
22	.....do.....	103	
23	.....do.....	102.75	
24	.....do.....	103.2	
25	.....do.....	103.8	
26	.....do.....	104	
27	.....do.....	103.5	
28	.....do.....	104	
29	.....do.....	102	
30	.....do.....	103.2	
Dec. 1	.....do.....	102	
2	.....do.....	103.2	
3	.....do.....	102.5	Killed by bleeding.

Post-mortem examination.—*Skin*: Presents many papules or slightly pink conical elevations, just raised enough to be felt by the finger; also black concretions like pin-heads and up to twice or thrice that size. It is, however, much cleaner than it was a week ago.

Digestive organs: Mouth normal, likewise the pharynx, larynx, and adjacent lymphatic glands.

Stomach: Has its mucous membrane dark brown along the great curvature, but without any extravasation, ulcer, or recent lesion.

Small intestines: Have a few spots of congestion, but these are very circumscribed. They contain twelve *ascarides*.

Large intestine: With few and slight patches of congestion. No enlargement of Peyer's patches, nor solitary glands; no erosions. The cæcum contains six whipworms.

Lymphatic glands of the mesentery are mostly gray on the outside from pigmentary deposit, but normal in their interior. The pigmentation is evidently the result of a former blood extravasation, as is so constantly seen in the earlier stages of the disease. The blood coloring matter is being transformed into black pigment, as a concomitant of convalescence.

Liver: Presents several hard yellow concretions as large as peas, also spots and patches of purple. Similar rounded yellow concretions are found in the mesocolon. They are covered by a reticulated membrane, and are probably the remnant of some parasite. *Gall-bladder* very full (the pig had been killed fasting), bile green, glairy.

Spleen and pancreas: Normal.

Kidneys: One contains two *hydatids*; excepting marked pallor of the cortical substance they are otherwise normal.

Hydatids: Nine of these are found in different parts of the peritoneum.

Heart: Right side normal; contains a small clot.

Left ventricle: Has numerous patches of extravasation, of a deep claret color, situated mostly on the *carnea columnæ* and *musculi papillares*. These have their seat in and beneath the serous lining, and barely extended into the muscular substance. The margin of the bicuspid valve is slightly thickened.

Lungs: Have a very few red consolidated lobulettes; of the remainder many are only partially dilated, though they have nearly their normal color.

Parasites: The terminal main bronchium of the right lung contains from thirty to forty worms (*Strongylus elongatus*). The lobules corresponding to this bronchium were slightly collapsed, but not consolidated nor congested.

Lymphatic glands of chest almost unchanged.

Brain: Healthy.

A microscopic section from a petechia on the heart showed, in addition to the blocked capillaries and blood extravasations, a fine example of the curious ovoid parasites long known as Rainey's cysts.

EXPERIMENT No. 6.

Male white pig, eight weeks old; no special breed; has been hitherto fed raw offal at a slaughter-house.

Date.	Hour.	Temperature of body.	Remarks.
Sept. 30	3 p. m.	103° F.	Has just come one mile in a wagon.
Oct. 1	9 a. m.	103.25	
1	6 p. m.	103.5	
2	9.30 a. m.	101.75	
3	.....do	101.5	
5	4 p. m.	102.25	
6	5 p. m.	100	
7	11 a. m.	103.25	Inoculated with quill dipped in pulmonary exudation of a pig that had been sick for a week or two. Infected quill sent from New Jersey.
8	12 noon	102.25	
9	11 a. m.	101.5	Rectum very red, and bleeds easily.
10	5 p. m.	103.75	
11	10 a. m.	102	
12	4 p. m.	102.5	
13	12 noon	102	
14	4 p. m.	104	
15	10 a. m.	103	
16	.....do	103	
17	.....do	101.75	
18	.....do	103	
19	.....do	102	
20	.....do	102.5	
21	.....do	103.5	
22	.....do	105	
23	.....do	103.5	Shows extensive blue patches on ears, flanks, and belly; also a pink rash, spots one to two lines in diameter. Appetite impaired.
24	.....do	104	
24	5 p. m.	105	
25	10 a. m.	105.25	
25	6 p. m.	105.75	
26	9 a. m.	105	Off feed, but active; ears partly purple; feces dark but moderately firm; struggles when the thermometer is used.
26	p. m.	104.75	
27	9 a. m.	105	Ears cold, livid in their outer half; pulse 120 per minute; breathing natural; is bright and feeds when up, but is inclined to lie, and shows much weakness; has always resented handling, but to-day, when caught, threw itself on its side and lay to have its temperature taken.
28	10 a. m.	103.5	
29	9.30 a. m.	104.3	Costive; dung in firm round balls, but of good color, and not specially offensive; runs around readily, but is weak; discoloration mainly on ears.
30	2 p. m.	106	
31	9 a. m.	103.75	Still costive; ears cold and very blue.
Nov.	1	10 a. m.	Weak on limbs; ears very dark purple; legs, tail, and rump badly blotched; bowels costive; dung in yellow balls.
	3	9 a. m.	Skin extensively blotched with dark purple; bowels costive; weak on limbs, especially the hind.
	3	9 a. m.	Very weak; disinclined to move; sways on its hind limbs when up; bowels quite soft.
	3	6 p. m.	Very dull; weak; evidently sinking; pulse 132 per minute; grits its teeth continually when up; breathing slow; nervous tremors and jerking constant.
	4	.....	Evidently delirious; screams when its door is opened, or when approached or touched; stands with difficulty, having its hind feet drawn forward to the level of the fore, or in front of them; muscular jerking constant, and prevents us from taking the pulse; no grinding of teeth; has not eaten since morning.
		Found dead.	

Post-mortem examination, November 4.—*Skin* : Almost universally scarlet, passing to dark purple on ears, belly, and hocks. Inner sides of the fore-arms and thighs have the skin white, but blotched with indelible purple spots one-half to one line in breadth. Many of these spots have a dark red or purple areola, with a firm black central scab or slough, evidently resulting from extravasation into the cuticle and superficial layers of the true skin. A section made perpendicularly to the surface shows much redness from blocked branching blood-vessels, especially around the hair follicles, and numerous minute spots of blood extravasations.

The snout is of uniform dark red, but with deeper purple spots ineffaceable by pressure.

Margin of the arms deep purple, almost black.

Digestive organs : Tongue, left border has an extensive slough near the tip. Right border has a number of firm elevated points, with purple areola and yellow centers.

Soft palate : Lower or buccal surface has its follicles deeply stained with blood and surrounded with purple areola; some follicles are filled with a yellowish material.

Right tonsil : Is swollen and has its ducts distended with a thick, tenacious, transparent mucus, containing great numbers of rounded granular cells.

Throat : Epiglottis bears spots of congestion ineffaceable by pressure.

Gullet : Healthy.

Stomach : Moderately full; acid. The mucous membrane on the great curvature presents patches of extravasation and erosion, the latter varying from one to three lines in diameter. Contains a worm (*ascaris Suilla*).

Small intestine : Contains twelve *ascarides*, one as much as ten and one-eighth inches in length. The mucous membrane presents along its whole course patches of redness, congestion, and softening, which are especially numerous and extensive towards its lower portion.

Ilio-cæcal valve : Bears a sloughing ulcer completely encircling it.

Cæcum : Contains a number of ulcers with white sloughs, many of them confluent, and forming bands or belts tending to encircle the gut, being situated on the summits of the transverse folds.

Colon : The anterior portion is much ulcerated, some of the ulcers being confluent and tending to form transverse bands as in the cæcum, while others are mere circular masses, two or three lines in diameter, with white necrotic center, and very little vascularity around the margin.

Rectum : Has patches of congestion and extravasation one line and upwards in breadth; in the case of one, advanced to the formation of a firm white slough and ulcer as in the cæcum. Close to the anus the entire mucous membrane is very deeply congested and thickened by exudation and extravasation.

Parasite : The cæcum contained one whipworm (*Tricocephalus crenatus*).

Parasites in the peritoneum : In the cavity of the abdomen were found twelve *hydatids* in connection with the liver, stomach, omentum, mesentery, meso-colon, and pelvic fascia. Three others were lodged in the perineum near the urethra.

Kidneys : Softened slightly and of an unusual pallor in their cortical portion.

Bladder sound. Intrapelvic urethra deep red, almost black, from petechial extravasation.

Urine about two ounces, turbid, strongly acid, albuminous; density, 1020; urea, 2 per cent.

Chest : Heart has a gelatinoid material filling the auricula-ventricular groove similar to that seen in No. —.

Right heart has a considerable buffy clot in both auricle and ventricle. Left auricle contains a small clot, almost the entire substance of which is pale or buffy. It further contains some very dark fluid blood.

Lungs : A few lobulettes only are infarcted or consolidated. In all cases the bronchia leading to the consolidated lobulettes are blocked by worms (*S. elongatus*). The other bronchia are clear of worms excepting in the immediate vicinity of the infarcted lobulettes. The great bulk of the lung is healthy, and of a soft white color, slightly tinged with pink.

Parasites : Attached to the pleura were two *hydatids*.

EXPERIMENT No. 7.

Female pig, eight weeks old, no special breed. Formerly fed raw offal at a slaughter-house.

Date.	Hour.	Temperature of body.	Remarks.
Sept. 30	3 p. m.	103.75° F.	Has just come one mile in a wagon.
Oct. 1	9 a. m.	103.3	
1	6 p. m.	103	
2	9.30 a. m.	102	Inoculated with quill charged with matter from diseased lung from New Jersey, six days old; quill treated with solution of copperas : 1 : 500.
3	.....do	100.75
5	4 p. m.	102.2	
6	5 p. m.	103	
7	11 a. m.	104	
8	12 noon ...	103.25	
9	11 a. m.	104.20	
10	5 p. m.	103.25	
11	10 a. m.	105.75	
11	5 p. m.	105.75	
12	4 p. m.	104	
13	12 noon ...	104	
14	4 p. m.	103.75	

EXPERIMENT No. 7—Continued.

Date.	Hour.	Temperature of body.	Remarks.
Oct. 15	11 a. m.	107° F.	Lively; good appetite.
16	10 a. m.	105.75	
17	... do.	102.25	
18	... do.	104.25	
19	... do.	103	
20	... do.	103.75	Scouring.
21	... do.	104.75	
22	... do.	104.25	
23	... do.	105.50	
24	... do.	105	Shows blue patches on the rump and flank, and a red rash on belly.
24	5 p. m.	105.5	
25	10 a. m.	106.5	Pulse 108 per minute. Will scarcely move from bed.
25	6 p. m.	104.75	Very dull; skin hot.
26	9 a. m.	103	Dull; lies much; does not struggle when handled; ears deep purple; bowels loose; dung fetid; skin cool.
26	6 p. m.	105.5	Dull, very hot skin.
27	9 a. m.	107	Skin very hot, hips stained with feces. Defecations semi-fluid, dark greenish, with clayey aspect, and fetid. Pulse 160 per minute. Breathing 28 per minute; deep, rather labored; wheezing inspiration, terminated by a snore. Can scarcely be roused, and crouches in the litter at once when released.
28	10 a. m.	104.5	Scouring. Feces offensive. Lies constantly on belly. When lifted hangs helpless with no attempt at struggling. Discoloration is very marked on ears, snout, belly, and thighs.
29	9.30 a. m. ..	102.75	Ran from bed to avoid being caught, but hangs helpless in hands when lifted. Feces very soft; fetid. Skin more deeply colored than before, but cool.
30	2 p. m.	99.75	Very sick; stupid; stands constantly with fore limbs drawn back and hind advanced, so that all four feet meet. Flanks hollow. Skin on discolorations very deep purple, almost black on rump. Bowels loose. Fetid.
31	9 a. m.	94.5	Lies in stupor, with limbs and body jerking every instant. Breathing slow, sighing, rattling. Feces and urine discharged involuntarily, and have soaked the left (lower) thigh, which, in consequence, shows a much brighter red than the other parts of the body. The general surface, excepting some white patches inside the arms and thighs, was of a dark purple, almost black on the ears, snout, median line of the abdomen, rump, and hocks. Killed by bleeding.

Post-mortem examination.—*Blood:* Scanty; that from axillary vein is neutra or slightly alkaline. Red globules deeply crenated and shrunken very disproportionately to the white globules, which are large and rounded, but appear deficient in numbers: 1 : 80.

Skin: Section of the blue skin of the ear shows cutis, cuticle, and bristle follicles deeply congested, most of the capillaries being blocked by coagulated blood, and microscopic extravasations appearing at short intervals. The red globules in this part are full, rounded, and of the usual size.

Digestive organs: Tongue has a series of white sloughs along its tip and right margin, resembling those of the intestines, being yellowish-white, laminated, non-vascular, and with very slight congestion and redness around them. Microscopically these sloughs are composed of epithelial cells with much granular matter. In one a central red spot presents stagnation and coagula in the capillaries and microscopic extravasations. It is manifest these form in the same manner with the sloughs in the intestines. Circumscribed spots of the mucous membrane become the seat of congestion, resulting in coagulation of the blood in the capillaries and exudation and extravasation alike into the epithelial and sub-epithelial layers, leading to thickening and induration of the deeper strata, and death of the more superficial ones.

Soft palate: The buccal or lower surface bears a similar slough, while many of its follicles are red, swollen, and filled with a yellowish-white (cheesy?) matter.

Throat: The laryngeal surface of the epiglottis is congested, the redness being ineffaceable by pressure. The mucous membrane on the back of the right arytenoid cartilage bears a four-lobed warty looking excrescence like a small pin's head, which, under the microscope, discloses only round granular cells and free granules.

Abdomen, Stomach: This contains a few ounces of half-digested food. This, together with the lower portion of the gullet, is of a deep yellow hue, apparently from regurgitated bile. No marked congestion of the mucous membrane.

Small intestine: Shows circumscribed spots and patches of congestion and small petechia, but no erosions.

Large intestine: One sloughing ulcer on the ilio-cæcal valve, three on the cæcum, and a considerable number in the colon. The colon and rectum also bore numerous patches of extravasation one to two lines in diameter. The last inch of the rectum is of an uniformly deep dark red. The mucosa and sub-mucosa are alike gorged with blood, and at one point a bleeding pile projects into the passage.

Liver, pancreas, and spleen are firm and seemingly healthy.

Kidneys: Firm and apparently sound; cortical part rather pale.

Bladder: Sound; moderately full.

Urine: Strongly acid; density, 1026; albuminous; urea, 3.20 per cent.

Parasites in abdomen: Attached to the peritoneum of stomach, liver, and spleen are seven *hydatids*.

Chest: Right heart contains clots; left heart empty. Auriculo-ventricular furrow filled with a gelatinoid material, which, under the microscope, appears as a loose fibrous stroma, its open meshes filled with a nearly homogeneous material, together with a few fat cells, granule cells, and abundant capillary net-work filled with uncoagulated blood. The white corpuscles are more abundant in these than in the axillary vein. No parasites nor ova could be found in this gelatinoid material.

Lungs: Mostly healthy. Isolated lobules and at certain points a few adjacent ones are infarcted and solid, and all such have their bronchia filled with worms (*Strongylus elongatus*) and a thick mucons. The plugged bronchia are mostly dilated, and on the mucous membrane of one such is a white patch about a line in diameter, resembling the sloughs on the intestines, but not so thick.

EXPERIMENT No. 8.

White pig, eight weeks old; common breed. Formerly fed raw offal.

Date.	Hour.	Temperature of body.	Remarks.
Sept. 30	3 p.m.	104° F.	Just come a mile in a wagon.
Oct. 1	9 a.m.	103	
1	6 p.m.	103	
2	9.30 a.m.	101.5	
3	9 a.m.	101	
4	(*)		
5	4 p.m.	98.75	Pigs in next two pens inoculated. Was found between door and bars, where it could not move.
6	5 p.m.	99	Again between door and bars.
7	11 a.m.	99	Costive.
8	12 noon	101	
9	11 a.m.	104.5	Still very costive.
10	5 p.m.	102.75	Bowels natural.
11	10 a.m.	102.5	
12	4 p.m.	103.25	
13	12 noon	103	Feces fetid.
14	4 p.m.	104	
15	10 a.m.	105	Lame in right fore limb.
16	...do	104.25	
17	...do	103.5	
18	...do	101.5	Scours. Feces fetid.
19	...do	102.5	
20	...do	103.75	Pigs in adjacent pens reinoculated.
21	...do	104.25	
22	...do	103.5	
23	...do	103.75	
24	...do	103	
25	...do	103	Placed in new pen, with infected pen on each side.
26	...do	103	
27	9 a.m.	103	
28	10 a.m.	103	
29	9.30 a.m.	105.3	Slight cutaneous rash
30	2 p.m.	104	Lively.
31	9 a.m.	104.2	No skin eruption.
Nov. 1	10 a.m.	105.75	Still looks well.
3	9 a.m.	104.8	Stiff in hind limbs.
3	6 p.m.	104	
4	9 a.m.	103	
5	9.30 a.m.	101	Placed in pen just vacated by dead pig.
6	10 a.m.	103.5	
7	...do	102.75	
8	...do	102.6	Dull; no appetite; skin covered with black spots one-third to one line in diameter. Right ear has purple spots. Killed by bleeding.

* No observation.

Post-mortem examination.—Skin: Nearly covered with black spots from one-third to one line in diameter, consisting of minute sloughs of epidermis, infiltrated and discolored with blood. In a number of these the subjacent layers of true skin are congested,

and even the seat of microscopic extravasations of blood, while in some cases the black necrotic cuticle is covered by a dried crust of exuded lymph of a dark brown color.

The right ear is of a deep purple color, and purple patches of various sizes are found inside forearms and thighs, on the hocks, and beneath the chest. In these purple patches the true skin is the seat of extensive congestion with stagnation and coagulation of the blood in many of the capillaries, and numerous microscopic clots of extravasated blood, while all the tissues are stained with hæmatine.

Blood: That from the jugular is very dark and forms slowly a soft diffuent clot; red globules round and large. That from the carotid is crimson, and clots quickly and firmly; red globules crenate, small and shrunken. Blood from both vessels is slightly alkaline.

Tongue: On the posterior third of the right border is a purple spot one-half line in diameter, which cannot be effaced by pressure. Under the microscope this shows the same congestion and microscopic extravasations with the spots on the skin. The conical papillæ on the upper surface of the organ near its base have their tips of a very deep purplish red.

Larynx: There is purple punctiform discoloration on the posterior surface of the epiglottis, which cannot be removed by pressure.

Lymphatic glands: Those around the throat are deeply stained with blood, some only superficially and some throughout. This is true also of the glands of the chest, groin, and abdomen, but especially of the mesentery. In several cases the glands appear to be enlarged. Microscopically, they present congested capillaries filled with coagulated blood, minute extravasations, and a profusion of granules and granular cells.

Abdomen—parasites in peritoneum: Two *hydatids* were found respectively in the omentum and mesentery.

Stomach: Well filled; great curvature of a deep dark red; contents strongly acid.

Small intestine: Congested in some parts, but with no observed extravasation nor deep discoloration; contents not abundant, but at intervals stained of a deep biliary yellow, and with excess of mucus throughout.

Ilio-cæcal valve: With Peyer's follicles dilated, and contents in some slightly yellowish.

Cæcum: Close to the ilio-cæcal valve a considerable erosion, with raised center and margin, but no excess of vascularity.

Colon: Six inches from the cæcum is a sloughing ulcer, one and one-half lines in diameter, raised above the adjacent membrane, the superficial layers being of a dirty white color in the center, and non-vascular, while around the margin of the ulcer is no marked redness.

Liver, colon, and rectum: Several extravasation patches averaging one line in diameter, bright red, and evidently quite recent.

No intestinal parasites.

Liver: Firm; solid; considerable portions are of a deep purple hue, the deep coloration being mostly confined to the center of the acini.

Kidneys: Cortical portion soft and of a very light brown, almost parboiled, appearance. Papillæ and medullary parts of a very deep red.

Muscles: Contained no parasites.

Brain: Normal.

EXPERIMENT No. 9.

Female pig, eight weeks old; breed, Chester White.

Date.	Hour.	Temperature of body.	Remarks.
Nov. 5	9.30 a. m.	103. 75° F.	Inoculated with part of small intestine of pig that died November 4, the virulent product having first been brought for five minutes in contact with a solution of chloride of lime (1::500).
6	10 a. m.	103. 75	
7	...do	103. 75	
8	...do	100. 75	
9	...do	101	Costive. Bowels loose.
10	...do	104	
11	...do	105	
12	...do	105	
13	...do	104	
14	...do	103. 8	
15	...do	104. 6	Scours.
16	...do	104. 75	
17	...do	104	
18	...do	105	
19	...do	105	Skin hot. Killed by bleeding.
20	...do	105	
21	...do	106	

Post-mortem examination, November 21, 11 a. m.—Body in good condition.

Skin: Almost devoid of eruption. The ears alone present increased vascularity, with a moderate blush and excess of scurf.

Digestive organs: Natural above the stomach. Guttural lymphatic glands in part congested and the seat of microscopic blood extravasations. Stomach mottled of a deep brown for a span of two and one-half inches by three inches along the mucous membrane, covering its greater curvature. Contents abundant, intensely acid, and fumes with ammonia.

Duodenum: Bears a small erosion near the pylorus.

Jejunum and ileum: Have patches of congestion and microscopic extravasation at intervals.

Ilio-cæcal valve: Has its edges thickened and of a dark bluish gray. Many follicles in Peyer's patch covering the valve are distended with a yellowish-white product, but there is no extra vascularity nor erosion.

Cæcum, colon, and rectum: Bear at intervals patches of congestion and microscopic extravasation in the mucous and submucous layers, over which the epithelial layer is softened and easily detached. No ulcers are found.

Liver: Discolored in parts by blue punctiform spots involving individual acini or several adjacent ones. Toward the lower margin of the gland the deep redness is mostly confined to the center of the acini.

Spleen: Seems large, but not unduly gorged with blood nor softened.

Pancreas: Healthy.

Kidneys: Pale in their cortical part, present punctiform petechiæ on the medullary portion and papillæ.

Bladder: Empty and normal. Ovaries and womb sound.

The mesenteric, sublumbar, and inguinal lymphatic glands appeared enlarged and more or less stained, of a deep blood-red color.

Parasites in the abdomen: Two ascarides in the small intestine; one *tricocephalus* in the cæcum.

Lungs: Present numerous congested lobules varying in color from brownish pink to a dark purple (almost black). The bronchia leading to these lobules are pervious and without parasites. The congested lobules seem less solid than when worms have been present.

Heart and pericardium: Normal.

Brain: Sound. Dura mater bears four patches of extravasation on the right side near the vertex. The average breadth of these is one line.

Spinal cord: Sound; subarachnoid fluid, about two drachms.

EXPERIMENT No. 10.

White male pig, eight weeks old; breed, Chester White; condition, fine.

Date.	Hour.	Temperature of body.	Remarks.
Nov. 4	12 noon	.....	{ Inoculated with mucus and congested and softened mucous membrane of the small intestines of No. —, found dead this morning.
5	9.30 a. m.	104.75° F.	
6	10 a. m.	103.75	
7	...do	103.8	
8	...do	103.75	
9	...do	102.5	
10	...do	104.5	
11	...do	103.5	
12	...do	104	Ears red.
13	...do	104.5	
14	...do	105	
15	...do	105.1	
15	3 p. m.	103.5	Losing condition. The skin shows the customary black necrotic spots of epidermis. Ears blue at edges. Respiration 36. Killed by bleeding.

Post-mortem examination.—*Skin*: Slight eruption on the ears and blueness on the margins.

Digestive organs: No lesions in the mouth or pharynx.

Pharyngeal lymphatic glands: Stained of a deep blood-red color.

Stomach: Well filled with food. Contents strongly acid. On the great curvature a space of two and one-half inches square has a brownish mottled discoloration, and numerous deeper brownish markings, as if from altered hæmatine.

Small intestine: Epithelium is thick, soft, and easily detached. Contents liquid, with a great excess of mucus. The bowel is reddened and congested around its entire

periphery, and for a considerable distance at intervals, the congested portions being mostly empty and contracted.

Ilio-cæcal valve: Peyer's patch, which passes over the valve, has many of its follicles filled up with a yellowish-white matter. The whole patch is swollen, but not very vascular to the naked eye.

Cæcum and colon bear petechiæ: Many solitary glands in the colon are unusually large; some excessively dilated, filled with yellowish matter, and apparently commencing to form ulcers. Spots of congestion scattered over the mucous membrane show minute extravasations when placed under the microscope.

Mesenteric glands: Some unchanged; some stained of a deep blood color. Inguinal glands large.

Kidneys: Normal.

Liver: Is firm and solid. Bears numerous punctiform petechiæ on the posterior surface of its right lobe, and a large dark-purple patch on the posterior aspect of its middle lobe.

Gall bladder: Moderately filled with a straw-colored, glutinous bile. Membranes of the bladder unchanged.

Pancreas and spleen: Normal.

Chest—heart: Left ventricle contains petechiæ. Right auricle just above the auriculo-ventricular valve presents a brownish-red spot which, under the microscope, is seen to contain much granular matter in the sub-serous connective tissue.

Lungs: The right has two dark, blood-colored spots on its posterior part. The left shows similar colorations, mostly in lines along the inter-lobular spaces. The bronchia leading to such points contained no parasites nor exudation.

Bronchial lymphatic glands: Normal.

Brain: Normal.

EXPERIMENT No. 11.

White male pig, eight weeks old; breed, Chester White.

Date.	Hour.	Temperature of body.	Remarks.
Nov. 5	9.30 a. m.	102.75° F.	
6	10 a. m.	103	
7	....do	102	Inoculated with small intestine of pig that died November 4 the gut having been fumigated five minutes with sulphurous acid.
8	....do	100.5	
9	....do	100.75	
10	....do	101.75	
11	....do	104.5	
12	....do	102.5	
13	....do	103.5	
14	....do	103.5	
15	....do	103.25	
16	....do	104.75	
17	....do	102.75	Scouring.
18	....do	104.5	Fetid scouring.
19	....do	104.5	
20	....do	105	Fæces still soft; unusually fetid; skin hot.
21	....do	105	
22	....do	108	
23	....do	103.75	
24	....do	103.3	
25	....do	104	
26	....do	104.25	
27	....do	103	
28	....do	104	
29	....do	103.5	
30	....do	103	
Dec. 1	....do	102.5	Red ears; dull; thriftless.
2	....do	103.2	
3	....do	102.25	
4	....do	100.75	Scours.
4	5 p. m.	102	
5	9.30 a. m.	102.25	
6	....do	102.5	Killed by bleeding.

Post-mortem examination.—*Skin*: In great part covered by the usual black concretion. Has patches of purple on ears and legs.

Digestive organs: Some deposit exists on the lower surface of the tongue, to the left of the frenum, composed of granular matter and cells having more than one nucleus; evidently the remnant of a small abscess. On the fauces, to the right side, is a purple patch not removed by pressure, extending to an inch in length and a quarter of an inch in breadth.

Pharynx and larynx: Normal.

Stomach: Full; contents moderately acid. Shows the usual brownish discoloration of the mucous membrane covering the great curvature.

Small intestines: Show only a few patches of congestion. The follicles of Peyer's patch just above the ilio-cæcal valve are considerably enlarged.

Large intestines: Show a great many enlarged solitary glands, yet but little congestion. The rectum is much congested and presents two ulcers: one with raised edges and raw, depressed center; the other, with a firm, dirty-white slough in the center.

Mesenteric lymphatic glands: Enlarged and thickly streaked with gray. Those near the ilio-cæcal valve, and those above the rectum, are congested and deeply reddened.

Inguinal glands: Are also greatly enlarged and streaked dark-gray with pigment.

Liver: Of normal consistency and color, excepting some few patches of deep purple. Gall-bladder moderately filled with a yellowish-green, viscid bile.

Pancreas: Healthy.

Spleen: A portion very dark colored (nearly black) extending its whole length and about half its breadth; is evidently gorged with blood; but is not raised above the level of the remaining part.

Kidneys: One contains an acephalocyst in its pelvis. The cortical substance of both is pallid, but no other change is noticeable.

The lungs, heart, and brain appeared healthy.

EXPERIMENT No. 12.

Male pig, eight weeks old; breed, Chester White.

Date.	Hour.	Temperature of body.	Remarks.
Nov. 19	10 a. m.	104.5° F.	Costive. Inoculated with blood of sick pig (No. 1) after treating the same with a solution of bromide of ammonia: 1:500.
	20 ....do	104.75	
	21 ....do	104.2	
	22 ....do	104.75	
	23 ....do	104.2	
	24 ....do	103.8	
	25 ....do	104	
	26 ....do	104.3	
	27 ....do	105.75	
	28 ....do	105.75	
	29 ....do	105.75	
	30 ....do	106	
Dec. 1	....do	106.2	Edges of ears purple. Purple spots on scrotum.
2	....do	106	Right ear a deep purple, bleeding at the point where exudation had formed a black scab.
3	....do	105	
4	....do	105	Ears blue; skin has purple blotches only partially effaceable by pressure. Feces liquid; yellowish white.
	4 5 p. m.	105	
	5 10 a. m.	105	
	6 ....do	101	Very prostrate; can barely rise.
	7 ....do ....	.....	Found dead in pen this morning.

Post-mortem examination.—**Skin:** Of ears, throat, breast, belly, and legs, of a uniform dark purple; white patches remain inside the forearm and thigh, and along the back, which is covered by a very thick scurf. The discoloration which is due to congestion of capillary vessels, the coagulation of blood within them, and numerous minute extravasations, is confined to the integument. The skin is also abundantly covered with the usual black concretions.

Digestive organs: Tongue blue, but with no abrasions.

Tonsils, fauces, and pharynx: The seat of general congestion and discoloration. Oesophagus has some spots of slight congestion.

Stomach: Distended with solid food; not so strongly acid as in many other cases. Its great curvature has the mucous membrane covered with patches of blood extravasation, such patches standing out in greater part as dark-red clots.

Small intestine: Exceedingly contracted, almost empty, and congested throughout in varying degree, from a simple branching redness, with softening of the mucous membrane and excessive production of mucus, to distinct circumscribed extravasations with decided thickening; in several instances the redness and the thickening is most marked on Peyer's patches. The duodenum contains three *ascarides*. Several small ulcers exist just above the ilio-cæcal valve.

Large intestine: Cæcum remarkably small and contracted. Neither cæcum nor colon contains much ingesta. The mucous membrane along the whole large intestine is inflamed, greatly thickened by exudation, and thrown into prominent circular folds. Its general color is of a dark brownish red, in many points verging upon black. At different points it shows the characteristic ulcers with a firm, dirty, white slough in the center of each, but these have in no case attained a large size, nor any marked thickening nor induration of their base, and without special care in the examination

might be easily overlooked. The rectum contains numerous blood extravasations and some considerable ulcers with the central whitish necrosed portions.

Mesenteric glands: Almost universally enlarged and of a deep red, from congestion and extravasation.

Liver: Of a very deep purplish brown, gorged with blood, but not materially softened nor moderately friable. It is especially dark near the margin of the lobes.

Gall-bladder: Moderately full, bile dark green and viscid.

Pancreas: Sound.

Spleen: Enlarged, gorged with blood, and almost black.

Kidneys: Nearly normal as examined externally. Cortical substance of a darker red than in most of the diseased pigs, and the papillæ bear black extravasations, punctiform and up to half a line in breadth. The right kidney contains a small cyst in its pelvis.

Left supra-renal capsule is enlarged to about one-third the size of the kidney, and has a clot of blood and a collection of cheesy matter superposed in its anterior end.

Lungs: Nearly normal; some congestion in the posterior lobes is evidently quite recent, and the cut surface freely exudes a frothy liquid.

Heart: Right ventricle slightly discolored by punctiform petechiæ beneath the endocardium. The great aorta contains a very firm clot, partly buffed.

Blood under a No. 10 Hartnack immersion shows no moving bacteria, but a great excess of granular matter.

EXPERIMENT No. 13.

White female pig, eight weeks old; breed, Chester White.

Date.	Hour.	Temperature of body.	Remarks.
Nov. 19	10 a. m.	105.5° F.	Inoculated with the blood of sick pig No. —, five drops being mixed with a drachm of a watery solution of potassium permanganate (1:500) and injected.
	20 ...do	104	
	21 ...do	103.25	
	22 ...do	103	
	23 ...do	104.75	
	24 ...do	103.25	
	25 ...do	104	
	26 ...do	104.8	
	27 ...do	104.75	
	28 ...do	104.5	
	29 ...do	104.75	
	30 ...do	105.3	
Dec. 1	...do	105	Deep-red ears; black concretions on skin.
	2 ...do	105.3	
	3 ...do	104.25	
	4 ...do	104.5	Stiff, unsteady gait; humped back; blue ears; costive.
	4 5 p. m.	103.5	
	5 10 a. m.	103.5	
	6 ...do	105	
	7 ...do	102.5	
	8 ...do	105	
	8 6 p. m.	104	
	9 9.30 a. m.	104	
	10 ...do	105	
	10 4.30 p. m.	104.5	
	11 9.30 a. m.	104	Very dull and quiet.
	11 5.30 p. m.	103.5	
	12 10 a. m.	107.75	Very languid and prostrate.
	12 5 p. m.	107.75	Does not rise when handled; breathing 28 per minute.
	13 11 a. m.	107	Feces soft, fetid, yellowish. Pig very prostrate, eats nothing, and scarcely moves when pricked to obtain a drop of blood. Blood contains moving bacteria.
	13 5 p. m.	107	

Pig found dead on the morning of December 14.

Post-mortem examination.—*Skin*: Blue spots on the belly, legs, rump, perineum, and ears. Free portions of the ears of a dark purple. Pink papillary eruption, and black concretions on the ears.

Digestive organs: *Tongue* has an ulcer, with slough a little to the left of the tip—size one and a half lines in diameter.

Tonsils and soft palate: The seat of a uniform bluish congestion. Submaxillary lymphatic glands in part reddened and congested.

Gullet: Contains clots of a stringy, fibrinous material.

Stomach: Near the left *cul de sac* is a dirty, yellowish-white false membrane of about one inch square. The great curvature is of a dark-brownish red, with some brighter red spots of more recent blood extravasation.

Small intestines: Nearly empty, though at intervals were round, hard pellets of in-

gesta. The coats of this bowel were more or less congested, with softening of the membrane at different points.

A large ulcer is forming on the edge of the ilio-cæcal valve, in which the outline of the follicles can still be seen of a yellowish color.

Large intestines: Cæcum and colon congested throughout, but much more at some points than at others. In the upper part of the colon are extensive deposits of false membrane of a dirty yellowish-white color, in places in spots of small size, and in others in extended patches of several inches in length. The cæcum has smaller spots of the same kind. The rectum is very much thickened and of a deep red throughout, the thickening existing mainly in the mucous membrane. It presents, further, nine small ulcers, with the characteristic dirty sloughs in the centers.

Parasites: The cæcum contains one whip-worm.

Liver: In the main firm, but contains bluish patches.

Pancreas: Apparently unchanged.

Spleen: Black, full of blood, but not apparently enlarged.

Mesenteric and sublumbar lymphatic glands: Are almost universally of a dark red, almost black color.

The left kidney: Has a cyst one-half inch in diameter in the anterior part of its pelvis. In common with the right kidney, it also presents numerous black petechia on the medullary portions and papillæ.

Chest and respiratory organs: Larynx shows considerable congestion, especially on the epiglottis and on the arytenoid cartilages.

Pleura: Contained an abundant blood-colored liquid exudation, especially in the right sac, where the lung had contracted extensive adhesions by newly-formed false membranes. The liquid effusion contained numerous white and red blood lobules and actively-moving bacteria, which assumed the most varied forms in rapid succession. A loose coagulum forms in the exposed fluid.

Bronchia: Filled with froth having a perceptibly pink tint.

Left lung: Anterior lobes congested and consolidated by recent exudation. Posterior layer lobe sound.

Right lobe: Consolidated throughout; sinks in water; but has not yet become firm, granular, nor friable. The color of this lung varies from a light brick-red to a deep red, approaching black, the darker shades mostly occupying the spaces of connective tissue between the lobules, these spaces being often stretched by the exudation to the breadth of a line or more. On making a section of the lung a considerable pulmonary vein was found to contain a friable granular grayish clot which had evidently existed for some time before death.

Pericardium: Contains a large amount of blood-colored effusion, in which blood-globules and moving bacteria abound. The parietal and visceral layers were connected by loose false membranes. Loose dark clots and some fluid blood existed in the right side of the heart, and spots of extravasation on the walls of the left ventricle.

Lymphatic glands: In the region of the throat are of a very deep red. The same remark applies to the bronchial and subdorsal glands.

Table showing the duration of incubation in different cases.

No.	Inoculated.	Apparently ill.	Duration of incubation, in days.	Percentage on different days.	Remarks.
1	Nov. 19	Nov. 20	1	6.6	Inoculated with old blood that had been kept eleven days in an incubator.
2	Oct. 6	Oct. 9	3	20	
3	Oct. 6	Oct. 9	3	20	Temperature raised for three days only.
4	Nov. 7	Nov. 10	3	13.3	
5	Oct. 8	Oct. 12	4	6.6	
6	Nov. 7	Nov. 11	4	13.3	
7	Oct. 5	Oct. 10	5	6.6	
8	Oct. 8	Oct. 14	6	13.3	
9	Nov. 4	Nov. 10	6	6.6	
10	Nov. 3	do	7	26.6	
11	do	do	7	26.6	
12	do	do	7	26.6	
13	Nov. 19	Nov. 26	7	6.6	
14	Nov. 19	Nov. 27	8	6.6	
15	Oct. 8	Oct. 21	13	6.6	

Table of experiments undertaken to ascertain the relative virulence of the products of Hog Fever after exposure to the air for different periods of time.

No. of experiments.	Nature of inoculated material.	Date of inoculation.	Date of first signs of illness.	Duration of fever.	Died.	Killed.	Recovered.	Remarks.
1	Inoculated from quill charged with diseased lung fluids of a pig which died five days before in North Carolina.	October 5	October 10	6 days			1	
2	Inoculated from quill charged with pulmonary exudation of a pig that died suddenly in New Jersey, twenty-four hours ago.	October 8	October 14	11 days		1		
3	Inoculated from quill-point dipped in pulmonary exudation of a pig which had been sick for a week or two. Virus from New Jersey, and twenty-four hours from pig.	October 8	October 21	11 days		1		Temperature was abnormally low for two days before death.
4	Inoculated from quill dipped in diseased lung liquids of a pig having no disease of the bowels. Virus from Indiana, and four days from pig.	November 3	November 10	11 days		1		Temperature was abnormally low for two days before death.
5	Pig placed in pen along with diseased intestines (semi-putrid) and manure from diseased pig. Both products from New Jersey, and forty-eight hours from pig.	October 20	No apparent effect.					When inoculated this pig had but barely recovered from the slight effects of a former inoculation.
6	Inoculated with the firm fibrous substance from the base of an intestinal ulcer. Also fed a portion of the same. Products from New Jersey, forty-eight hours from the pig, and slightly putrid.	October 20	No apparent effect.					
7	Inoculated with the firm fibrous substance from an intestinal ulcer. Product sent from New Jersey, forty-eight hours from the pig and slightly putrid.	October 20	Temperature unaffected.					A pink rash appeared on the skin October 31.
8	Inoculated with portions of dried intestine from New Jersey, and at least four days from North Carolina, and at least four days from the pig. Product dried in sun and air.	November 3	November 10	18 days		1		Rise of temperature very moderate.
9	Inoculated with intestinal ulcer and mucus from Illinois. Product sent in closely corked bottle containing liquid: was at least three days from the pig and slightly putrid.	November 3	November 10	18 days		1		Temperature high throughout.
10	Inoculated with mucus and congested soft.	November 4	November 10	5 days		1		

11	<p>oned mucous membrane from pig No. 14, found dead in its pen the same morning. Product taken not more than twelve hours after death.</p> <p>Inoculated by injecting under the skin one drachm of blood taken from a diseased pig and kept in an incubator for eleven days, having had communication with the air only through narrow tubes blocked with cotton-wool. The blood smelt stale, but not putrid.</p>	November 19....	November 20.....	20 days	<p>Maintained a high temperature for twenty days with diarrhoea, purple ears, purple blotches on body, papules of a pink color and black concretions. After this temperature was normal, but diarrhoea and skin eruption and discoloration remained for four days, when it was again inoculated with blood swarming with bacteria (moving).</p>
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Experiments undertaken to test the effect of disinfectants on virulent products inoculated.

No. of experiments.	Disinfectant.	Nature and treatment of inoculated material.	Date of inoculation.	Date of first signs of illness.	Duration of fever.	Died.	Killed.	Recovered.	Remarks.
12	Bisulphite of soda.....	Pig inoculated from a quill dipped in the liquids of a diseased lung in North Carolina, five days ago. Before inoculation the quill was placed five minutes in a solution of bisulphite of soda: 1:500.	Oct. 5	No febrile change.	.....	1	.....	.....	Died the seventh day from lung worms.
13	Carbolic acid.....	Pig inoculated with quill charged like the last. In North Carolina, six days from the pig, and before inoculation dipped for five minutes in a solution of carbolic acid: 1:500.	Oct. 6	Oct. 9	9 days	.....	.....	1	.....
14	Sulphate of iron.....	Pig inoculated with quill charged with virus six days ago in New Jersey, and before inoculation dipped five minutes in a solution of copperas: 1:500.	Oct. 6	Oct. 9	20 days	.....	1	.....	Killed October 31, after two days of abnormally low temperature, and when already in <i>articulo morbis</i> .
15	Chloride of zinc.....	Pig inoculated from a quill charged with virus from the lungs of a New Jersey hog that had been sick for a week or two, virus one day from the pig. Before inoculation was steeped five minutes in a solution of chloride of zinc: 1:500.	Oct. 8	(?)	.....	.....	.....	.....	High temperature on fourth, sixth, and ninth days only.
16	Sulphurous acid.....	Pig inoculated with diseased intestine, three days removed from the sick hog No. 14, and smoked for five minutes with the fumes of burning sulphur.	Nov. 7	Nov. 11	20 days	.....	1	.....	Killed twenty-sixth day.
17	Chloride of lime.....	Pig inoculated with diseased intestine, three days from the sick hog No. 14, and steeped five minutes in a solution of chloride of lime: 1:500.	Nov. 7	Nov. 10	11 days	.....	1	.....	Fever ran very high.
18	Bromide of ammonium.	Pig inoculated with blood from No. 17, a few drops being added to a drachm of a solution of bromide of ammonium (1:1:500) and thrown under the skin.	Nov. 19	Nov. 27	8 days	.....	.....	.....	.....
19	Pernmanganate of potassa.	A few drops of blood from No. 17 were mixed with a solution of permanganate of potash and thrown under the skin.	Nov. 19	Nov. 26	18 days	.....	1	.....	Fever ran very high. The day before death the blood contained numerous moving (septic) bacteria.

EXPERIMENT NO. 20.

Experiment undertaken as a test of the propagation of the disease-poison through the air.

October 5.—A pig was placed in a pen between two infected ones, and separated from each only by an impervious double wall of matched boards, with building-paper between. The only means of communication was through the open air by means of ventilators at the front and back of each pen, and the openings of which in adjacent pens were less than a foot apart. On the ninth, tenth, and eleventh days the pig had an elevated temperature and was lame in the right shoulder, the illness being evidently rheumatic.

On October 29th, the twenty-fourth day, the temperature rose 2° and remained at 104° F. and upward for six days (till November 3rd). It then showed a daily diminution, and by November 8th, having attained the natural standard, the pig was destroyed.

Experiments on sheep, rabbit, and dog. Inoculation with fresh virulent pig's blood, containing moving bacteria.

Subject.	Date of inoculation.	First signs of illness.	Duration of incubation.	Duration of illness.	Remarks.
Merino wether	Dec. 14	Dec. 15	1	Temperature rose 2.25° , but was normal on the second day. Purged actively for three days. When inoculated the pig was in advanced non-febrile stage of the fever, and the temperature did not rise above the normal.
Adult female rabbit	Dec. 14	Dec. 15	1	.....
Newfoundland puppy, seven weeks old.	Dec. 14	Dec. 15	1	1	
Female pig, twelve weeks old.	Dec. 14	.....	.....	.....

Inoculation with fresh virulent blood in which no moving bacteria had been observed.

Subject.	Date of inoculation.	Remarks.
Merino wether	Nov. 21	Scouring and rise of temperature 1° on fourth and sixth days only.
Do	Dec. 7	No appreciable effect.
Adult female rabbit	Nov. 21	Do.
Do	Dec. 7	Temperature rose 1° on the first day only.

Table showing relation of body-temperature to the weather during October.

Date.	Thermometer in open air.				Rain and snow.	Barometer.				Humidity.				Temperature of pigs.			
	7 a. m.	2 p. m.	9 p. m.	Mean.		7 a. m.	2 p. m.	9 p. m.	Mean.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Rose. Fell.	Un- ch'ped.	Sick.
Oct. 1	58.0	71.7	62.7	64.13	29.336	29.262	29.204	...	580	555	717	635	627	592	...	...	...
2	60.8	67.5	60.1	62.80	29.340	29.134	29.126	...	618	573	675	630	601	580	...	...	...
3	50.6	71.2	58.5	60.10	29.242	29.144	29.124	...	506	493	712	573	565	560	...	...	...
4	45.6	63.8	57.5	55.63	29.252	29.192	29.202	...	456	435	638	528	515	521	...	...	...
5	44.3	55.8	51.6	50.56	29.324	29.254	29.248	...	443	418	558	486	516	501	...	...	...
6	50.8	53.8	43.8	49.46	29.268	29.318	29.418	...	508	475	598	488	438	421	...	...	...
7	36.6	56.3	51.0	47.96	29.418	29.278	29.290	...	366	341	563	477	510	490	...	...	...
8	50.6	62.6	60.9	58.03	29.302	29.328	29.140	...	506	484	626	525	609	590	...	...	...
9	62.6	66.3	56.5	61.80	29.076	29.940	29.156	...	626	585	663	615	565	550	...	...	...
10	48.2	55.0	40.6	47.93	29.256	29.352	29.302	...	482	458	550	458	406	392	...	...	...
11	37.4	56.8	51.5	48.56	29.250	29.152	29.186	...	374	365	568	483	515	486	...	...	...
12	49.4	55.6	46.5	50.50	29.244	29.226	29.248	...	494	466	556	495	465	457	...	...	...
13	40.3	61.8	52.8	51.63	29.334	29.288	29.368	...	403	390	618	514	528	492	...	...	...
14	54.7	71.2	63.2	63.03	29.354	29.264	29.272	...	547	495	712	598	632	615	...	...	...
15	60.5	74.2	64.2	61.30	29.244	29.186	29.210	...	603	534	742	638	672	690	...	...	...
16	62.0	77.5	67.2	69.23	29.268	29.198	29.182	...	630	580	775	625	672	583	...	...	...
17	62.4	75.8	60.4	66.20	29.170	29.020	29.092	...	624	580	758	621	604	590	...	...	...
18	47.5	40.2	40.8	42.83	29.104	29.082	29.040	...	475	455	402	398	408	402	...	...	...
19	42.6	40.2	43.5	42.06	29.872	29.026	29.104	...	425	420	402	385	435	422	...	...	...
20	48.8	55.8	49.0	51.20	29.154	29.146	29.210	...	488	432	558	448	490	465	...	...	...
21	41.7	64.5	53.5	53.23	29.376	29.306	29.292	...	417	390	645	522	535	510	...	...	...
22	42.0	67.2	54.2	56.80	29.880	29.176	29.004	...	490	448	672	548	542	520	...	...	...
23	48.2	49.8	49.8	49.26	29.880	29.406	29.864	...	482	475	498	497	498	472	...	...	...
24	43.3	51.8	40.2	45.10	29.244	29.338	29.456	...	433	412	518	453	402	392	...	...	...
25	33.8	51.3	49.5	44.86	29.538	29.456	29.448	...	338	325	513	453	495	477	...	...	...
26	47.8	64.8	61.5	58.03	29.452	29.382	29.270	...	478	433	648	556	615	590	...	...	...
27	54.5	49.8	41.8	49.36	29.208	29.186	29.202	...	565	527	448	490	418	413	...	...	...
28	37.3	42.5	38.3	38.36	29.310	29.328	29.348	...	373	335	425	357	383	370	...	...	...
29	28.6	47.8	41.3	39.23	29.394	29.284	29.214	...	286	278	478	394	413	387	...	...	...
30	40.7	49.5	47.2	45.66	29.032	29.944	29.010	...	107	985	495	472	472	451	...	...	...
31	41.6	48.6	32.5	39.23	29.888	29.866	29.068	...	416	386	486	392	325	321	...	...	...
Mean for month				52.67											3		

Table showing relation of body-temperature to the weather for November.

Date.	Thermometer in open air.				Rain and snow.	Barometer.				Humidity.				Temperature of pigs.				
	7 a.m.	2 p.m.	9 p.m.	Mean.		7 a.m.	2 p.m.	9 p.m.	Mean.	Dry.	Wet.	Dry.	Wet.	Dry.	Wet.	Un- changed.	Rosc.	Fell.
Nov. 1	32.8	42.8	38.5	38.36		28.210	28.142	28.186		328	280	368	365	370	370	2	2	1
2	34.5	52.8	42.0	45.76	Three hours	28.214	28.100	28.260		365	323	430	420	385	385			
3	34.3	36.6	35.0	35.30	Four hours	28.466	28.456	28.300		343	311	366	337	335	335	1	4	
4	34.2	32.5	29.2	31.96	Snow	28.322	28.344	28.342		342	313	325	292	272	272	1	3	
5	28.5	32.5	32.5	30.73	Snow 2.5 inches	28.438	28.358	28.214		265	258	332	287	325	312	2	2	
6	28.5	34.2	32.5	32.96	Snow	28.072	28.946	28.050		292	287	355	343	342	342	2	3	
7	31.5	37.2	34.2	34.33	Snow	28.068	28.838	28.866		292	287	372	364	325	315	2		
8	25.3	29.2	28.4	28.96	Snow	28.944	28.058	28.110		283	278	292	285	294	272	2	6	1
9	29.8	35.2	36.5	33.83	Snow .02 inch	28.180	28.070	28.084		298	284	352	312	365	357	2	4	
10	39.1	42.3	43.7	41.70	Snow	28.960	28.054	28.060		391	362	423	397	402	402	6		
11	40.5	50.0	43.8	45.43	Five hours	28.976	28.732	28.722		405	385	500	452	448	438	2	4	
12	46.4	49.5	44.2	46.70	Three hours .18 inch	28.656	28.750	28.736		464	451	495	422	442	430	2		
13	41.0	40.8	34.2	38.33	Four hours	28.784	28.968	28.500		412	340	406	348	342	308	2	2	
14	31.4	36.6	28.2	32.06	Four hours .07 inch	28.436	28.500	28.500		314	306	366	325	292	273	1	2	
15	23.5	40.8	32.5	32.26		28.642	28.568	28.544		235	226	408	362	325	317	3	3	
16	34.2	45.5	43.2	42.30		28.522	28.464	28.488		362	341	455	410	452	432	3	3	
17	47.5	51.8	48.3	49.20	Rain .26 inch	28.376	28.278	28.356		475	462	518	508	483	478	1	3	
18	45.8	47.6	46.8	46.73	Rain .26 inch	28.214	28.160	28.170		498	450	476	475	468	465	3	1	
19	45.4	48.3	47.5	47.06	Rain .07 inch	28.138	28.090	28.010		454	454	483	468	475	466	1		
20	46.2	48.3	46.7	47.06		28.984	28.892	28.920		462	458	483	468	475	460	3	4	
21	43.5	49.8	47.6	47.30		28.010	28.972	28.786		435	430	498	455	476	470	4		
22	44.8	57.2	37.2	40.16	Rain .83 inch	28.692	28.864	28.362		468	438	372	364	365	358	3	4	
23	37.8	37.5	35.6	36.96	Rain .83 inch	28.372	28.456	28.670		378	358	375	350	356	345	2	5	
24	39.7	43.6	32.0	38.43	Rain .04 inch	28.920	28.026	28.158		397	392	436	405	320	315	1	5	
25	39.2	43.2	36.3	39.56		28.056	28.946	29.170		392	376	432	435	363	350	5	1	
26	32.8	34.5	32.8	33.38	Twelve hours .02 inch	28.328	28.372	28.368		328	218	345	305	328	305	7	2	
27	28.2	35.0	37.2	33.46	Ten hours .46 inch	28.204	28.948	29.004		282	270	350	336	372	347	3	1	
28	42.2	38.2	37.0	39.13		28.634	28.854	29.070		422	391	382	343	370	338	1	4	
29	37.6	43.7	59.2	40.16		28.208	29.184	29.270		376	342	387	387	392	380	3	1	
30	56.4	38.6	33.6	36.26		28.420	29.472	29.466		364	335	336	338	336	321	3	1	
Mean for the month				38.76	.....												

SUPPLEMENTAL REPORT.

As an addendum to my former report, I would respectfully submit the following further observations on the fever of swine, commonly known as hog cholera:

EXPERIMENTS IN FEEDING THE VIRULENT MATTER.

A healthy pig was fed the substance of an intestinal ulcer and a little manure from the same bowel, but showed no evil results for fourteen days, when it was put to other uses. It should be added that the ulcer fed to this pig was partially putrid, and was inoculated on two other swine without success.

A second pig was fed a portion of dried intestine and its contents, both of which had remained packed in wheat-bran for a month. Notwithstanding this, the animal retained good health for seventeen days, when it, too, was put to other uses. The material fed to this pig acted with fatal effect on two other pigs on which it was inoculated.

These experiments can only be taken as showing that a small quantity of poison may pass through the intestinal canal with impunity, but they would not warrant the conclusion that similar materials would be equally harmless when taken in larger quantities and with every meal, as invariably happens when swine are fed in the ordinary manner and plunge their filthy feet and noses fresh from the pestiferous manure into the feeding-trough. Dr. Osler has succeeded in developing the disease by feeding the diseased intestine, but as the feeding was accomplished by force there is just the possibility of abrasion and direct inoculation. Abrasions are indeed so common in the mouth from injuries by the teeth and by hard objects masticated and derangements of the epithelial covering of the mucous membrane of the stomach and intestines, are so frequent in connection with slight gastro-intestinal disorders, that it is needless to calculate on an immunity which can only be secured by the entire absence of such lesions. If to secure immunity in feeding we must provide that not even a worm shall bite the mucous membrane of the stomach or intestine, any guarantee rests on an exceedingly slender basis and had best be rejected at once.

SUCCESSFUL INOCULATION WITH FROZEN PRODUCTS OF THE DISEASE.

In two cases I have successfully inoculated virulent products which had been frozen hard for one and two days respectively. In both instances the resulting disease was of a very violent type, and would assuredly have proved fatal if left to run its course. The freezing had certainly failed to impair the virulence; it had rather sealed it up to be opened and given free course on the occurrence of a thaw; for, once it is frozen, it is manifest that no further change could take place until it was again thawed out, and if it was preserved for one night unchanged in its potency, it would be equally unaffected after the lapse of many months, provided its liquids had remained in the same crystalline condition throughout. In this way undoubtedly the virus is often preserved through the winter in pens and yards, as well as in cars and other conveyances, to break forth anew with returning spring. This is precisely what we find to be the case with the other fatal animal plagues, the virus of rinderpest, lung fever, anthrax, and aphthous fever, being often bound up through the winter with frozen manure to reappear with undiminished power on the access of warmer weather. This is a matter of no small moment inasmuch as the long-continued frosts of our Northern States prevent any such destruction of the poison as takes place so readily in summer in connection with the alternate wetting and drying and the resulting putrefaction.

I have had instances brought under my notice in which, after the prevalence of the fever in a herd in early summer, new swine were introduced into the open yard a month or two after all trace of the disease had disappeared and had continued to preserve the most perfect health. This is quite in keeping, too, with my failure in the attempts to convey the disease by feeding and inoculating with a semi-putrid intestine. It serves, moreover, to explain my failure, as the exposure and wet at a moderately high temperature would lead in both cases alike to decomposition and destruction.

The bearing of this upon the prevention of the disease is self-evident. Infected yards and other open and uncovered places may be considered safe after two months' vacation in summer, provided that sufficient rain has fallen in the interval to insure the soaking and putrid decomposition of all organic matter near the surface, and that there are no great accumulations of manure, straw, hay, or other material in which the virus may be preserved dry and infecting. In winter, on the other hand, the yard or other open infected place may prove non-infecting for weeks and months, and yet retain the virus in readiness for a new and deadly career as soon as a thaw sets in. Safety in such circumstances is contingent on a disuse of the premises so long as the frost continues and for at least one month thereafter. Even during the continuance of frost such places are dangerous, as the heat of the animals' bodies or of the rays of

the sun at mid-day may suffice to set the virus free. Again, while they are especially dangerous on the accession of warmer weather, yet, when once the temperature has risen permanently above the freezing point, we may count upon the rapid putrefaction that ensues in all organic bodies that have been frozen and on a disinfection almost as speedy, and it may be at times even more speedy than in the extreme heat of summer. The course of safety is to hold all places that have been infected in late autumn or during winter as still infected until one or two months after the frost has gone out of the ground in spring.

This, of course, has little bearing upon the question of covered pens, barns, cars, &c., in which the poison may be preserved dry, active, and accessible in winter and summer alike. On this question of infection through pens in winter I instituted the following experiment:

CONTAGION FROM AN INFECTED PEN.

A healthy pig was placed in a pen from which a sick one had been removed thirteen days before. The pen had been swept out, but subjected to no disinfection other than the free circulation of air; and as the pig was placed in the pen on December 19, all moist objects had been frozen during the time the apartment had stood empty. The pig died on the fifteenth day without having shown any rise of temperature, but with *post mortem* lesions that showed the operation of the poison. This case was an example of the rapidly fatal action of the disease, the poison having fallen with prostrating effect on vital organs—the lungs and brain—and cut life short before there was time for the full development of all the other lesions. It sufficiently demonstrates the preservation of the poison in covered buildings at a temperature below the freezing point.

SUCCESSFUL INOCULATION OF PIGS WITH VIRUS THAT HAD BEEN KEPT FOR A MONTH IN DRY WHEAT-BRAN.

Appended will be found the daily record of two pigs infected by inoculation with bowel ingesta and mucous membrane that had been preserved for a month in dry wheat-bran. In both cases the disease followed the inoculations promptly and ran a severe course, one case proving fatal, while in the other death was anticipated by killing the animal. At the autopsies the usual characteristic lesions were found.

Here, as in the case of the virus preserved on quill-tips, we find the poison preserved without the slightest impairment of its potency. Thus two series of inoculations with dried virus show how careful and thorough must be the disinfection in dry seasons, and indoors in all seasons, and the importance of the destruction by fire, or in other certain manner, of all dry fodder and litter in which the poison may have been secreted.

COHABITATION WITH SICK PIGS IN DIFFERENT STAGES OF THE DISEASE.

A healthy pig was inclosed in a pen with a sick one which had been inoculated with virulent blood on two occasions; the first thirty days and the last five days before. After the first inoculation the pig had suffered from a slight fever and the characteristic phenomena of the disease. Before the second inoculation the temperature had been normal for eight days, and it was not materially affected by the operation. In short, the disease had manifestly spent itself in the system of the pig, though it had left it a most shrunken, emaciated, and wretched spectacle.

The two pigs occupied the same pen, lay on the same bed, and fed from the same trough for sixteen days, during which no unequivocal sign of disease was manifested in the healthy pig. It seemed indeed to have successfully resisted the contagion.

It was now removed to another pen and placed in company with a pig in which the disease had just reached its height. On the twelfth day thereafter its temperature permanently rose, and it passed through a sharp attack from which it is now recovering.

This seems to show that the poison is much less virulent after the febrile stage of the malady has passed, and that the danger from the recuperating animal decreases with advancing convalescence. At the same time it must not be too hastily concluded that a mild form of the disease did not exist in this pig during the occupancy of the first pen. It appears unquestionable that the poison may be present in the system, and yet give rise to so little disorder that the most careful observer would fail to detect anything amiss.

OCCULT FORMS OF THE DISEASE.

On *post-mortem* sections I have found the characteristic lesions of the bowels and lymphatic glands, in cases where no cutaneous rash or discoloration, no rise of temperature, no loathing of food, nor constitutional disorder had betrayed its presence during life. The occurrence of such slight and occult forms of the disease must present

a serious obstacle to all attempts to stamp it out. In most of the plagues of animals and notably in lung fever, in aphthous fever, and in rinderpest out of its native home, the rise of the body temperature precedes all outward manifestations of the disease. In these affections the indications of the thermometer alone enable us to separate the sick and healthy before the disease has attained to a stage of material danger to their fellows. But in the pig fever the earliest symptoms will vary according to the vagaries of the poison and its primary seat of election. Perhaps the most common initial symptom is the enlargement of the inguinal glands, but it may be some derangement of the digestive organs, or it may be the elevation of the body temperature, or it may be the appearance of red spots or blotches on the skin, or finally the poison may be operating in the system in the absence of all external manifestations. It is noticeable that since the access of extremely cold weather the cutaneous discoloration has been much less extensive than during the warmer season. Even when the temperature has been abnormally raised it will rise and fall in such an irregular manner that no single observation will be always successful in detecting the disease. To detect such cases the investigation must be conducted from day to day, and in view of all possible manifestations of the disease, to be successful. Then again the temperature, even in health, varies widely in different swine and under different conditions of life, so that a knowledge of the body heat of the individual in the existing environment is essential to the drawing of sound deductions from thermometric indications.

INFECTION OF OTHER ANIMALS THAN SWINE.

I consider the most important part of my researches to be that which demonstrates the susceptibility of other animals than swine to the fever we are investigating. Dr. Kline of London, England, claimed, nearly a year ago, that he had conveyed the disease "with difficulty" to rabbits, Guinea-pigs, and mice, but he gives no hint as to whether he had subjected the question to the crucial test of reinoculation from these animals back upon the pig. This test it seemed very important to apply, so that the identity or otherwise of the two diseases might be determined. I have accordingly instituted experiments on a rabbit, two sheep, a rat, and a puppy, the three former of which have turned out successfully.

INFECTION OF A RABBIT FROM A SICK PIG.

After two inoculations with questionable results, made with the blood of sick pigs, in which microzymes had been observed, a rabbit was once more inoculated, this time with the pleural effusion of a pig that had died during the previous night, and in which were numerous actively moving bacteria. Next day the rabbit was very feverish and ill, and continued so for twenty-two days, when it was killed and showed lesions in many respects resembling those of the sick pigs. The blood of the sick rabbit contained active microzymes like those of the pig.

SUCCESSFUL INOCULATIONS FROM THE SICK RABBIT.

On the fourth day of sickness the blood of the rabbit containing bacteria was inoculated on a healthy pig, but for fifteen days the pig showed no signs of illness. It was then reinoculated, but this time with the discharge of an open sore which had formed over an engorgement in the groin of a rabbit. Illness set in on the third day and continued for ten days, when the pig was destroyed and found to present the lesions of the fever in a moderate degree.

A second pig, inoculated with the frozen matter which had been taken from the open sore in the rabbit's groin, sickened on the thirteenth day and remained ill for six days, when an imminent death was anticipated by destroying the animal. During life and after death it presented the phenomena of the plague in a very violent form.

It can no longer be doubted, therefore, that the rabbit is itself a victim of this disease, and that the poison can be reproduced and multiplied in the body of this rodent and conveyed back with undiminished virulence to the pig. We may follow Dr. Kline in according a similar sad capacity to the other rodents, mice and Guinea-pigs. The rabbit, and still more the mouse, is a frequent visitant of the hog-pens and yards, where it eats from the same feeding-troughs with the pig, hides under the same litter, and runs constant risk of infection. Once infected they may carry the disease as widely as their wild wanderings may lead them, and communicate it to other herds at a considerable distance. Their weakness and inability to escape, in severe attacks of the disease, will make them an easy prey to the omnivorous hog, and thus sick and dead alike will be devoured by the doomed swine.

PROBABLE SUSCEPTIBILITY OF OTHER RODENTS.

The infection of these rodents creates the strongest presumption that other genera of the same family may also contract the disease, and by virtue of an even closer rela-

tion to the pigs may succeed in conveying the malady to distant herds. The rat is at once suggested to the mind as being almost ubiquitous in piggeries, as feeding in common with the swine, as liable to be devoured by the hog when sick or dead, as given to wandering from place to place, and as possessed of a vicious habit of gnawing the feet and other parts of his porcine companion, and thus unconsciously inoculating him.

I have up to the present time had the opportunity of inoculating but one rat with the hog-poison. Unfortunately my subject died on the second day thereafter, the body showing some suspicious lesions, namely, congested lungs with considerable interlobular exudation, congested small intestines, dried-up contents of the large intestines, and sanguinous discoloration of the tail from the seat of inoculation to the tip.

INOCULATIONS FROM THE RAT.

With the fresh congested small intestine of the rat I inoculated one pig, and with the frozen intestine one day later I inoculated a second. The first had no appreciable rise of temperature, loss of appetite, nor digestive disorder, but on the sixth day pink and violet eruptions, the size of a pin's head and upward, appeared on teats and belly, and on the tenth day there was a manifest enlargement of the inguinal glands. From what I had seen of the occult forms of the disease I was led to the opinion that this was one of them. Unfortunately, I had at the time no healthy pig available for the crucial test of reinoculation.

In the second pig, inoculated with the frozen intestine, the symptoms were too obscure to be of any real value. As soon as I obtain a supply of rats I propose to subject this question to a further investigation.

SUCCESSFUL INOCULATION OF SHEEP.

Less significant than the infection of rats, yet of immense practical importance, is the susceptibility of sheep to the hog-fever. I have experimented on two sheep of different ages, an adult merino wether and a cross-breed lamb, and in both cases have succeeded in transmitting the disease.

INFECTION OF THE MERINO.

This sheep was inoculated by hypodermic injections of one and a half drachms of blood from a pig just killed. On the fourth day he had elevated temperature, and on the sixth scouring and snuffling breathing, but the symptoms rapidly subsided. On the fourteenth day he had an injection of two drachms more of blood from a sick pig, and on the twenty-first day of one drachm of blood and pleural fluid containing multitudes of bacteria. Next day the temperature was raised and the snuffling breathing reappeared, both symptoms continuing for some time. On the sixth day his blood was found to contain moving bacteria similar to those present in the injected blood. On the twenty-third day from the last inoculation he was reinoculated, this time with the scurf from the ear of a sick pig. This was followed by no rise of temperature, but there existed much irritation of the bowels with redness and swelling of the anus, occasional diarrhea, and the passage of an excess of mucus, sometimes stained with blood. Seventeen days after the last inoculation he had another hypodermic injection of one drachm of blood and pleural fluid from a pig just killed. As before, this led to an extensive rise of temperature while the intestinal catarrh continued.

INFECTION OF THE LAMB.

The lamb was first injected with a saline solution of the scurf and cutaneous exudation from the ear of a sick pig. There followed a slight rise of temperature, a scurfy eruption on the ears and oozing of blood from different points on their surface, so as to form dark red scales.

On the sixth day following it was reinoculated by the hypodermic injection of one drachm of pleural fluid from a pig just killed, the fluid containing an abundance of moving bacteria. Next day there was extreme rise of temperature, some dullness and swelling in the right axilla, but appetite and rumination were not altogether lost nor suspended. On the fifth day there was tenderness and unusual contraction of the rectum with the passage of bloody mucus, and on the eighth day profuse diarrhea with the passage of much mucus.

SUCCESSFUL INOCULATION OF A PIG FROM THE SICK SHEEP.

A healthy pig was inoculated with mucus from the anus of the wether, and showed a slight deviation of temperature for five days, but without any other marked symp-

tom of illness. Eleven days later it was reinoculated with scab from the ear of the lamb, and again three days later with anal mucus from the sheep. The day before this last inoculation it was noted that the inguinal glands were much enlarged, and six days after the temperature was elevated, and purple spots appeared on the belly. This fever temperature has lasted but a few days up to the present time, but, taken along with the violent rash and the enlarged lymphatic glands, it furnishes satisfactory evidence of the disease. We can therefore affirm of the sheep as of the rabbit that not only is it subject to this disease, but that it can multiply the poison in its system and transmit it back to the pig.

Two other pigs have been inoculated from the lamb, but during the few days that have elapsed they have shown no outward symptoms.

UNSUCCESSFUL INOCULATION OF A PUPPY.

A drachm of blood and pleural fluid containing bacteria, from a pig just dead, was injected hypodermically on the side of a Newfoundland puppy. Next day she was very dull and careless of food, while her temperature was abnormally high. The third day the heat of the body was natural, and a fair amount of liveliness had returned. A few days later a large abscess appeared on the seat of inoculation, discharged and healed, and from this time the health seemed to be re-established.

SIGNIFICANCE OF THE INFECTION OF RODENTS AND SHEEP.

Many will, no doubt, be startled at the above developments, and inquire, half incredulously, How is it that the susceptibility of these animals to this affection has never been noticed before? It may even be suspected that we have been mistaken as to the identity of the disease, and that we may be dealing with the *malignant anthrax* (*bloody murrain*) rather than the specific fever of swine. But a slight attention to the phenomena and *post-mortem* lesions of our cases will speedily dispel the doubt. *Malignant anthrax* is more fatal to sheep and rabbits than to the other domestic animals, whereas in my sheep the disease was so mild that its very existence would almost certainly have been overlooked in the ordinary management of a flock, and it was only detected in these cases by the careful thermometric and other observations made day by day on the inoculated animals. In the rabbit the disease was more severe, and would undoubtedly have proved fatal if left to itself, yet even in this animal there was no indication of the rapid course and speedy destruction which characterize the *malignant anthrax*. Again, although in both diseases alike, the lymphatic glands are the seat of morbid enlargement, yet the increase and engorgement of the spleen which are so constant and so characteristic in *malignant anthrax* were altogether absent in my pigs infected from the rabbit. Moreover the disease in the pigs ran the usual comparatively slow course of the pig-fever, rather than the speedily fatal one of the *anthrax* affection. In the inoculated pigs, too, the combined lesions of the skin, lungs, bowels, and lymphatic glands are unquestionably those of the swine-plague, and not those of *malignant anthrax*.

It is not surprising that the disease should have been hitherto unrecognized in the sheep and rabbit. The most obvious symptoms in pigs—the pink, purple, violet, or black spots and patches of the skin—were never observed in these animals, unless we can consider the eruption on the ears of the lamb as of this nature. In the sheep, to which alone much attention would be paid, the constitutional disturbance was so slight as to be easily overlooked, the appetite even, and rumination scarcely suffering for a day.

Again, the failure to recognize the identity of a disease in two different genera of animals is familiar to all who have made a study of comparative pathology. Cow-pox and horse-pox have existed in all historic ages, but it remained for the immortal Jenner to recognize and show their identity in the last century. *Malignant anthrax* has prevailed from the time of Moses, yet in all the older veterinary works we find its different forms described as independent diseases—*blain*, *quarter evil*, *putrid sore throat*, &c. Even to the present day many cases of this disease occurring in the human subject (malignant pustule) are mistaken for erysipelas (black erysipelas). Glanders in horses seems to have been known to Aristotle, and was familiar to the ancient Greek Zooiâtres and Roman Veterinarii, but its identity with the same disease in man was only shown in 1810 by Waldinger, of Vienna. *Asiatic cholera* has prevailed in the East from time immemorial, but it is only in the present century that its identity with cholera in animals has been shown by Indian and European observers.

It is no wonder, therefore, that the mildness of the hog-fever in the sheep should have masked its true nature, and that the universal disregard of the disease of the small rodents should have led us to ignore it in these as well. Now, however, that the truth is forced upon us, we must recognize it in all further attempts to arrest the course of the disease or to exterminate it. The destruction and burial of infected pigs, and the disinfection of the premises where they have been, can no longer be considered a sufficient safeguard. The extermination of rabbits, wild and tame, of Guinea-pigs, of mice, and probably also of rats, within the infected area, will be equally essential. Sheep must be rigidly excluded from the hog inclosures, and if

they have gained admittance they must either be destroyed with the pigs, if few and valueless, or they must be shut up in a secluded place, or sent to a safe distance from all hogs until they can be certified as healthy, when they may be disinfected and released. No danger of a fatal extension among sheep is to be apprehended; the disease appears to be as harmless to the sheep as the fatal glanders is to the dog, yet the infected sheep is evidently dangerous to the hog, and must be carefully secluded in all measures for the suppression of the plague.

RECORD OF EXPERIMENTS—No. 1.

Pig of common race, eight weeks old.

Date.	Hour.	Body temperature.	Remarks.
Nov. 19	10 a. m.	104° F.	Costive. Inoculated with blood of pig killed November 8, and kept in inoculator in isolation apparatus, communicating with the air only through plugs of cotton-wool. The blood smells stale, not putrid; its cells have disappeared.
	20 .....do.....	104.5	
	21 .....do.....	104.5	
	22 .....do.....	105.2	
	23 .....do.....	104.75	
	24 .....do.....	104	
	25 .....do.....	104	
	26 .....do.....	104.75	
	27 .....do.....	104.5	
	28 .....do.....	105	
	29 .....do.....	104.75	
	30 .....do.....	104.75	
Dec. 1	.....do.....	103.5	Quite dull. Purple spots and black concretions on the skin.
	2 .....do.....	104.75	Red and black spots on the skin.
	3 .....do.....	104.25	
	4 .....do.....	102.5	Scours. Ears blue and cold.
	4 5 p. m.	104	Do.
	5 9.30 a. m.	104	Do.
	6 .....do.....	105	Do.
	7 .....do.....	103.5	
	8 .....do.....	103.5	
	8 6 p. m.	104	
	9 9.30 a. m.	103	Bowels continue loose.
	10 .....do.....	103.5	
	10 4.30 p. m.	104	
	11 9.30 a. m.	103	
	11 6 p. m.	103	
	12 10 a. m.	102.25	Feces fluid and of a bright yellow color.
	12 5 p. m.	102.75	
	13 9.30 a. m.	102.75	Quiet; ears deep red; extensive papular eruption and greasy exudation on the skin; scouring.
	13 5 p. m.	102.5	
	14 9 a. m.	100.5	Hypodermic injection of one dram of blood and pleural fluid from pig just dead. Inoculation liquid contains numerous actively moving bacteria.
	15 .....do.....	102.75	Dull; has not eaten supper of last night.
	15 5 p. m.	102.75	Scours.
	16 10 a. m.	102.25	Do.
	16 5 p. m.	102.5	
	17 10 a. m.	102	
	17 4 p. m.	103.25	Slightly costive.
	18 10 a. m.	101	Sebaceous secretion excessive on the inner sides of thighs and forearms, &c. Has a blackish-brown color, and disagreeable but not putrid odor.
	18 4 p. m.	103.2	
	19 10 a. m.	103.5	
	20 .....do.....	102.5	
	21 .....do.....	103.25	Improving; regaining appetite and liveliness.
	21 5 p. m.	103	
	22 9 a. m.	102.5	
	22 4.30 p. m.	102	
	23 9 a. m.	103	
	24 .....do.....	103.25	
	25 .....do.....	103.75	
	26 .....do.....	104	
	27 .....do.....	102.5	
	28 .....do.....	103	
	29 .....do.....	104	
	30 .....do.....	102	
	31 .....do.....	102.75	
Jan. 1	.....do.....	102.5	
	2 .....do.....	103	
	3 .....do.....	103	
	4 .....do.....	102.5	
	5 .....do.....	101.5	
	6 .....do.....	103	
	7 .....do.....	102.75	Killed by bleeding.

Post-mortem examination at once.—*Skin*: Covered almost universally by a blackish exudation in great part dried into crusts. On the ears are some remnants of the former exudations and extravasations; half an inch of the tip of one ear is necrotic.

Digestive organs: Mouth healthy. *Guttural lymphatic glands* greatly enlarged and gray from pigmentation.

Stomach: Full; contents dry and acid; has reddish discoloration as from blood extravasations and broad lines along its great curvature. The mucous membrane at this point is peeling off.

Small intestine: Contents abundant and liquid. Spots of congestion of about one line in diameter; no ulcers nor erosions; six ascarides.

Large intestine: Presents little abnormal. One or two depressed spots like cicatrices.

Mesenteric glands: Greatly enlarged and mostly grayish from pigmentary deposit. *Inguinal glands* also much enlarged and gray.

Thoracic duct: Is filled with a milky fluid.

Liver: Firm patches of purple. The lower margin very pale; almost transparent.

Spleen: Small, rigid, twisted as if from binding organizing lymph. Its surface is unusually white and fibrous-looking, but there is a deep black line along its anterior border.

Pancreas: Sound.

Heart: Right ventricle marked with bluish discoloration, evidently from former ecchymosis. One flap of the tricuspid valve has a round, blackish nodule beneath the endocardium. Left ventricle with similar bluish surface, and bicuspid valve with a translucent thickening.

Respiratory organs: Larynx and right bronchus have each a dark red ecchymosis. Lungs have black spots of ecchymosis and slight reddening of certain lobules.

Bronchial glands: Enlarged and pigmented.

Subdorsal glands: Enlarged and of a very deep red.

Brain: Generally unchanged.

EXPERIMENT No. 2.

Poland-China pig, nine weeks old.

Date.	Hour.	Temperature of body.	Remarks.
Dec. 19	10 a. m.	103.5 ° F.	Fed infected feces and intestinal mucous membrane preserved for a month in dry bran.
	20 ...do	104.25	
	20 5 p. m.	103.5	
	21 10 a. m.	103.25	
	21 5 p. m.	104	
	22 9 a. m.	103.5	
	22 4.30 p. m.	102.5	
	23 9 a. m.	102.75	
	24 ...do	102	
	25 ...do	101.75	
	26 ...do	103.5	
	27 ...do	102	
	28 ...do	100.75	
	29 ...do	102	
	30 ...do	101	
	31 ...do	101	
Jan. 1	...do	102.5	
	2 ...do	102	
	3 ...do	103	
	4 ...do	102.75	
	5 ...do	103	Inoculated with intestine of pig which died yesterday. The intestine had been frozen over night.
	6 ...do	103	
	7 ...do	104.75	
	8 ...do	105	
	9 ...do	104	
	10 ...do	103	
	11 ...do	105	
	12 ...do	104	
	13 ...do	105.25	Purple spots on ears and rump; greasy exudation from skin. Enlarged inguinal glands.
	14 ...do	105	
	15 ...do	106.5	Scours; a bright-yellow liquid feces.
	16 ...do	105	Do.
	17 ...do	105	Do.
	18 ...do	105.5	Scours.
	19 ...do	105.5	Do.
	20 ...do	105.5	Do.
	21 ...do	103	Do.
	22 ...do	107	Great prostration; will not rise for food nor to have temperature taken. Purple blotches are especially abundant on ears and snout, and to a less extent on the head, generally the teats, rump, and hips. When lifted scarcely made a struggle. Killed by bleeding.

Post-mortem examination.—*Blood*: Dark colored; contained moving bacteria.

Digestive organs: Tongue sound. Tonsils unusually red in their openings.

Submaxillary and guttural lymphatic glands: Of a dark red, merging to a dirty yellow.

Peritoneum: With considerable reddish-brown effusion and bands of recently formed false membrane. The liquid coagulates on exposure. Under the microscope (No. 10 Hartnack) it is seen to contain numerous moving bacteria, also others less active, and two or four segmented chain-like.

Stomach: Full; sour. Great curvature mottled red and brown.

Small intestines: Has considerable tracks of deep congestion. It contains much mucus, and ten ascarides. One ascaris extended into the gall-duct and as far as the center of the right lobe of the liver; a second extended into the middle hepatic lobe. The pressure of these had led to a considerable dilatation of the bile-duct just above its junction with the cystic duct.

Ilio-cæcal valve: Very black, with its follicles enlarged and filled with a yellowish product. The whole length of the large intestine is black from deep pigmentation of its mucous membrane, which is, besides, greatly thickened and puckered. Both conditions imply former active inflammation.

The rectum: Of a dark grayish red; had several caseous deposits under its mucous membrane.

The mesentery: Contains a yellowish caseous deposit as large as a pea.

All the *lymphatic glands of the abdomen* are greatly enlarged, pigmented, and in many cases reddened from recent blood-staining. The *inguinal lymphatic glands* and those of the flank are in a similar condition.

Liver: Has patches of deeper purple discoloration, especially deep in the center of the acini. *Pancreas* sound.

Spleen: Shrunken with puckered edges, and whitish thickening of its proper capsule.

Kidneys: Vascular, congested and softened; corticle part dull brownish yellow. Medullary, more or less purple, with deeper shades in lines radiating from the papillæ.

Respiratory organs: Margin of epiglottis bears a blue patch, surrounded by ramified redness. *Bronchi* and *bronchia* sound.

Lungs: Of varying shades of light pink in the lobules, excepting one or two, which are of a dark red. The interlobular spaces are of a deep blood-red color, giving a dark marbling over the entire surface. *Right pleura* contains a little effusion with thread-like false membranes, and the same bacteria named as existing in the peritoneum.

The *axillary prepectoral, internal pectoral, bronchial, and sub-dorsal lymphatic glands* were enlarged, pigmented, and in some cases blood-stained.

The *heart* bore some purple discolored spots on the internal lining.

EXPERIMENT NO. 3.

Poland China pig, nine weeks old.

Date.	Hour.	Temperature of body.	Remarks.
Dec. 19	10 a. m.	102.5 ° F.	Placed in infected pen from which a sick pig had been removed December 6.
20	....do	102.75
21	....do	103.75
21	3 p. m.	103	
22	9 a. m.	102.8	
22	4.30 p. m.	102	
23	9 a. m.	101	
24	....do	102.75
25	....do	101.5
26	....do	102
27	....do	102.75
28	....do	101.75
29	....do	98.8
30	....do	101
31	....do	101.5
Jan. 1	....do	100
2	....do	101
3	....do	101
4do	96.5	Eyes very red and prominent. Scarcely able to stand. Screams when touched. (Evident phrenitis.) Died at 2 p. m.

Post-mortem examination the same afternoon.—*Skin*: Presented little change.

Digestive organs: Mouth sound, fauces and pharynx of a deep blue color, irremovable by pressure.

Stomach: A portion of about an inch square of a deep red, and with an abundant gelatiniform exudation under the mucous membrane.

Small intestines: Empty, much congested, and containing ten ascarides.

Large intestines: Has its mucous membranes congested, reddened, and thickened. At intervals are circumscribed spots of bloody extravasation, covered by a clot of blood on the free surface. These vary from one to two lines in diameter. In a great portion of the colon the contents are very dry and blood-stained. Between the layers of the mesentery, among the convolutions of the large intestines, are translucent gelatinoid exudations.

Liver: Gorged with blood, softened, and somewhat friable.

Spleen and pancreas: Normal.

Mesenteric glands: Small, but in some instances partially discolored by blood.

Lungs: Congested throughout, of a brick-red, with circumscribed black spots of extravasation.

Bronchia: Filled with frothy liquid, but without worms.

Heart: The right cavities were gorged with an intensely black clot. The left cavities contained a smaller clot. No ecchymosis was observed.

EXPERIMENT NO. 4.

Poland China pig, nine weeks old.

Date.	Hour.	Temperature of body.	Remarks.
Dec. 19	10 a. m.	103. 75° F.	Inoculated with virus preserved one month in wheat bran.
20	...do	104. 2	
20	5 p. m.	104. 5	
21	10 a. m.	104.	
21	5 p. m.	105.	
22	9 a. m.	104	
22	4. 30 p. m.	104. 75	
23	9 a. m.	103. 5	
24	...do	104	
25	...do	102. 25	
26	...do	101. 75	
27	...do	103. 75	
28	...do	102. 75	
29	...do	102	
30	...do	101	Passes bloody mucus from the bowels.
31	...do	105	
Jan. 1	...do	106	
2	...do	103	
3	...do	102	
4	...do	101	
5	...do	101	
6	...do	98. 75	
			Very low; can scarcely stand. Died during the following night.

Post-mortem examination January 7.—*Skin*: Extensively covered with purple maculae and patches. Snout deeply blood-stained, some of the spots extending over the lips into the mouth. The greater part of the skin being black, congestions and extravasations into it are only clearly made out when it is cut into.

Digestive organs: Tongue sound. Pharynx has pellets of food accumulated in front of the epiglottis. Submaxillary and guttural lymphatic glands enlarged and stained of a blood red.

Stomach: Not one-third filled; odor faint, mawkish, not sour. Bears red patches of congestion and ecchymosis on its great curvature.

Small intestines: Congested almost throughout. Peyer's patch just above the ilio-cæcal valve has some black ecchymosis. On the lower surface of the valve the follicles are enlarged and filled with a yellowish deposit.

Cæcum and, to a still greater extent the *colon* and rectum, are deeply congested, and of a dark red; the mucous membrane is much thickened and thrown into prominent folds and wrinkles.

Two ascarides were found in the small intestine.

Liver: Extensively discolored of a purple hue, the staining being deepest in the center of the acini.

Spleen: Large, gorged with blood. *Pancreas* unchanged.

The lymphatic glands of the liver, stomach, intestines, sublumbar region, pelvis, groin, and flank are much enlarged and of a very deep red, in many cases almost black.

Kidneys: Cortical substance pale; medullary deep red, with spots of ecchymosis. The anterior part of the left kidney contained a cyst as large as a bean. The right contained two cysts, one in the pelvis, the other in the anterior part.

Respiratory organs: The epiglottis bore on its posterior surface some congestion and redness, partly ramified and partly diffuse and ineffaceable by pressure.

The lungs have a few black spots of ecchymosis and blood-colored extravasation in the connective tissue between the lobules. The lobules themselves are only very slightly congested. The left main bronchus present a spot of ecchymosis.

Heart: Empty, presents slight sanguineous discoloration through the lining membrane.

EXPERIMENT No. 5.

Poland China pig, nine weeks old.

Date.	Hour.	Temperature of body.	Remarks.
Dec. 19	10 a. m.	104° F.	Inoculated with ingesta from the large intestine; also a portion of the mucous membrane, both having been preserved in dry bran for a month.
	20 .....do.....	104.5	
	21 .....do.....	103.75	
	21 5 p. m.	104	
	22 9 a. m.	103	
	22 4.30 p. m. ..	104	
	23 9 a. m.	101	
	24 .....do.....	103.5	
	25 .....do.....	103	
	26 .....do.....	102.5	
	27 .....do.....	102.5	
	28 .....do.....	102.75	
	29 .....do.....	101	
	30 .....do.....	102	
	31 .....do.....	105	
Jan. 1	.....do.....	106.75	Rump and tips of ears purple.
2	.....do.....	104.75	
3	.....do.....	102	Scours.
4	.....do.....	102	
5	.....do.....	102	
6	.....do.....	103	
7	.....do.....	101.25	
8	.....do.....	102.5	Scours; feces fetid.
9	.....do.....	101	Very weak; eats little; fetid diarrhea.
10	.....do.....	100.9	
11	.....do.....	100	
12	.....do.....	98.5	
13	.....do.....	102.5	
14	.....do.....	100.5	
15	.....do.....	104.5	Killed by bleeding.

Post-mortem examination at once.—**Skin:** Ears of a deep purple and thickly covered with concretions. Remainder of the skin has similar concretions, but no ecchymosis is observable. The snout presents scarcely a spot of discoloration.

Digestive organs: Extensive induration and ulcer on the left side of its median part and extending over its border. A similar but smaller ulcer exists on the right margin directly opposite. Small ulcers exist on the dorsum near the hip; also a diphtheritic-looking deposit extending over the margin on to the lower surface. Tonsils, palate, and pharynx sound. Submaxillary and guttural lymphatic glands are enlarged and congested.

Stomach: Has its mucous membrane thick, rugose, and as if water-soaked along its great curvature.

Small intestine: With mucous membrane thickened and puckered throughout; the duodenum deeply congested.

Ilio-cæcal valve: Thickened; its follicles enlarged and filled with a yellowish deposit.

Mucous membrane of *cæcum* and *colon* deeply pigmented and of a dark gray aspect. Some parts of the colon are still red in patches. Rectum pigmented, presents several small ulcers and a caseous deposit beneath the mucous membrane.

Liver: Bears blue patches of various sizes; gall-bladder contains a little bile of a bright yellow color, with greenish flakes.

Spleen: Small and puckered, so that its borders turn inward.

Pancreas sound.

Abdominal lymphatic glands: Hepatic, gastric, splenic, pancreatic, mesenteric, sublumbar, and pelvic, as well as the iliac, are enlarged, pigmented, and partially congested.

Kidneys: Corticle substances pale yellowish, slightly softened; in the case of one, reddened to the depth of one-third line. Medullary portion deeply colored.

Respiratory organs: Larynx and trachea sound; right lung with almost the normal pale pink hue externally, but seems to be congested internally when cut into; left lung nearly normal; **heart** and pericardium normal.

EXPERIMENT No. 6.

Poland China pig, eight weeks old.

Date.	Hour.	Body temperature.	Remarks.
Dec. 19	10 a. m.	104° F.	Placed in pen with pig partially convalescent.
20	...do	103	
21	...do	103.75	
21	5 p. m.	104.5	
22	9 a. m.	103.75	
22	4.30 p. m.	104	
23	9 a. m.	104.25	
24	...do	102.75	
25	...do	103.75	
26	...do	105	
27	...do	103	
28	...do	104	
29	...do	104	
30	...do	103	
31	...do	102.5	
Jan. 1	...do	102	
2	...do	103	
3	...do	103.25	
4	...do	103	Placed in pen with another pig in height of the disease.
5	...do	103	
6	...do	101	
7	...do	102.75	
8	...do	102.5	
9	...do	103	
10	...do	103	
11	...do	103.25	
12	...do	104	
13	...do	101.25	
14	...do	103.5	
15	...do	100	
16	...do	105	
17	...do	105.5	
18	...do	104.8	
19	...do	104.5	
20	...do	104.25	
21	...do	105	
22	...do	103	
23	...do	103	
24	...do	103	
25	...do	101	
26	...do	104.75	
27	...do	104	
28	...do	103	
29	...do	102	
30	...do	102	
31	...do	103	

EXPERIMENT No. 7.

Female rabbit.

Date.	Hour.	Body temperature.	Remarks.
Nov. 21	Inoculated hypodermically with one drachm of the blood of a sick pig just killed.
22	9 a. m.	104° F.	
23	...do	104	
24	...do	104.1	
25	...do	104.5	
26	...do	104.5	
27	...do	104	
28	...do	104.5	
29	...do	104	
30	...do	104	
Dec. 1	...do	104	Hypodermic injection of one drachm of blood of pig which died during last night.
2	...do	104	
3	...do	104	
5	...do	104	
7	.....	.....
8	9 a. m.	105	
9	...do	104.75	
10	...do	103.75	
11	...do	103.75	
12	...do	104.5	
13	...do	103	

A firm ovoid nodule in the seat of inoculation.

EXPERIMENT No. 7—Continued.

Date.	Hour.	Body temperature.	Remarks.
Dec. 14	9 a. m.	103.5° F.	Hypodermic injection of one drachm of blood of pig found dead this morning. Blood swarming with actively-moving bacteria.
15	...do	105.5	Has not eaten supper.
15	5 p. m.	105.5	Eats nothing.
16	10 a. m.	106.25	
16	5 p. m.	106.75	
17	10 a. m.	105.5	
17	4 p. m.	103	
18	10 a. m.	105.75	
18	4 p. m.	105.5	
19	10 a. m.	104	Blood showed numerous moving bacteria as in the pig. Induration in the right iliac region.
20	...do	104.75	
21	...do	103.5	
21	5 p. m.	104.5	
22	9 a. m.	103.5	
22	4.30 p. m.	104.25	
23	9 a. m.	103.5	
24	...do	104	
25	...do	104	
26	...do	104.75	
27	...do	104.75	
28	...do	105	Abscess has burst to the right of vulva. A white fibrous extravascular mass exposed.
29	...do	104	
30	...do	105	
31	...do	105	
Jan. 1	...do	104	
2	...do	104	
3	...do	103	
4	...do	103	
5	...do	103	
6	...do	102.5	Is very low and has eaten little for some days.
7	...do	102	Sore still open. Killed by bleeding.

Post-mortem examination at once.—Connected with the raw sore in the groin was an immense mass of whitish, fibrous material, infiltrated with pus, and extending from the lumbar vertebrae above to the median line below. The mesenteric glands were enlarged and blood-stained. Two had been transformed with yellow, cheesy-looking masses. The stomach and bowels appeared healthy; also the liver and spleen, heart and lungs.

EXPERIMENT No. 8.

Poland China pig, eight weeks old.

Date.	Hour.	Body temperature.	Remarks.
Dec. 18	4 p. m.	102.75° F.	
19	...do .....	...	Inoculated with blood of sick rabbit hypodermically.
20	...do .....	...
21	4 p. m.	103.5	
22	9 a. m.	101.5	
22	4.30 p. m.	103.75	
23	9 a. m.	100.75	
24	...do	101	
25	...do	101	Skin hot. Hides under the litter.
26	...do	101.5	
27	...do	101	
28	...do	101	Scours.
29	...do	100	
30	...do	100	
31	...do	102	
Jan. 1	...do	102.75	
2	...do	102	Inoculated with matter from open sore of sick rabbit.
3	...do	101.5	
4	...do	102	
5	...do	103.5	Feces fetid.
6	...do	104.5	
7	...do	104.75	
8	...do	104.5	
9	...do	104.25	Fetid diarrhoea.
10	...do	103	
11	...do	103	
12	...do	102.5	
13	...do	103	
14	...do	104.75	
15	...do	105	Killed by bleeding.

Post-mortem examination.—*Skin*: Naturally black; no purple nor congested spots seen.

Digestive organs: Mouth and throat healthy.

Guttural lymphatic glands: Enlarged and somewhat congested.

Stomach: Moderately full; of a deep brownish red along its great curvature.

Small intestine: Slightly congested in patches; contains twelve ascarides.

Large intestine: Nearly normal.

Mesenteric lymphatic glands: Enlarged and slightly congested. Their surface presents clear, glistening, rounded masses like pins' heads. *Inguinal glands* have the same character.

Lung: Isolated lobulettes are dark red and solid; at some points the interlobular connective tissue is distended by a dark-red infiltration.

In the bronchia of the left lung were twelve strongly.

EXPERIMENT No. 9.

Common white pig, ten weeks old.

Date.	Hour.	Body temperature.	Remarks.
Jan. 7	10 a. m.	104° F.	Inoculated with frozen white product from the groin of the infected rabbit.
8	...do	102.5	
9	...do	103	
10	...do	103	
11	...do	101.75	
12	...do	102	
13	...do	103	
14	...do	103	
15	2 p. m.	101	
16	10 a. m.	102.25	
17	...do	103.25	
18	...do	103.8	
19	...do	103	
20	...do	105.25	
21	...do	105.3	
22	...do	104.5	Purple spots on rump. Eats little.
23	...do	105	Blue ears.
24	...do	102.5	Scours, bright-yellow liquid feces. Inappetence.
25	...do	105	Do.
26	...do	98.75	Do.
27	...do	97	Does not rise when temperature is taken; is stretched on its side with muscular jerking. Killed by bleeding.

Post-mortem examination.—*Skin*: Margin of snout for one-half line deep of a dark brown, and apparently without vascularity or life. Beneath this is a red congested line.

Ears: Deeply blotched with dark red and purple maculæ, each about one-half inch in diameter, but to a great extent confluent, so as to form extended lines and patches. Stump of tail maculated. Perineum and adjacent parts of hip of a deep purple.

Digestive organs: Tongue with a whitish fur. On the center of its dorsal surface is a dark spot about two lines in diameter, which is found to cover a considerable extravasation and clot on the muscular substance. Glandular follicles on the lower surface of the soft palate filled with a soft yellowish puriform mass.

Submaxillary lymphatic glands: Greatly enlarged and of a deep purple. *Guttural glands* also blood-stained and moderately enlarged.

Stomach: Full, very fetid, not sour. Great curvature has its mucous membrane much congested with numerous black spots of extravasation projecting beyond the general surface. In the left *cul de sac* the ingesta next the mucous membrane is of a dark baked appearance and firmly adherent to the mucous membrane, the epithelial layer of which comes off with it. It has evidently been adherent for some time.

Small intestines: Have large tracts of congestion, and in the duodenum and commencement of the jejunum are ten ascarides. Seven ascarides have made their way into the gall duct and the different lobes of the liver, but none in the cystic duct nor gall-bladder. The biliary duct is greatly distended and coated with a layer of yellowish-green biliary coloring matter.

The ilio-cæcal valve: Has its margin of a deep grayish-black and its follicles enlarged.

The large intestines: Are throughout black from pigmentary deposit, the blackness being especially marked on the agminated gland, extending from the ilio-cæcal valve on the colon. Many round blackish elevations are scattered over the length of the colon, appearing like enlarged solitary glands. On some parts of the colon the dark

color is modified by the deep red of a recent congestion. Through the whole length of the large intestine the mucous membrane is considerably thickened and puckered. Near the anus are some caseous deposits beneath the mucous membrane, but communicating with the surface by open orifices.

The liver: Has great patches of a deep purple, deepest in the center of the ascini.

The gall bladder: Is full of dark green, thick, very viscid bile.

The inguinal, sublumbar, mesenteric, mesocolic, gastric, and hepatic lymphatic glands: Are greatly enlarged and deeply blood-stained.

The kidneys: Somewhat softened, are of a dull yellowish brown in the cortical portion and of a purple hue, with darker radiating lines in the medullary.

Respiratory organs: Larynx sound. Lungs sound, excepting some slight congestion in particular lobes, and the filling of the bronchia and air-cells with blood evidently drawn in in dying. No pleural effusion.

Heart and pericardium: Sound.

EXPERIMENT No. 10.

Merino sheep.

Date.	Hour.	Body-temperature.	Remarks.
Nov. 21	2 p. m.	108° F.	Hypodermic injection of one and a half drachms. Blood from sick pig just killed.
	22 10 a. m.	102.5	
	23 ..do	103.75	
	24 ..do	103	
	25 ..do	104.5	
	26 ..do	103.25	
	27 ..do	104.5	Scouring and snuffling.
	28 ..do	103.75	
	29 ..do	102	
	30 ..do	102.5	
Dec. 1	..do	103.75	
	2 ..do	102.5	
	3 ..do	103.25	
	5 ..do	102.5	
	7 ..do		Hypodermic injection of two drachms blood from pig which died during the night previous.
	8 ..do	103.75	
	9 ..do	103.3	
	10 ..do	103.75	
	11 ..do	100.25	
	12 ..do	102	
	13 ..do	103	
	14 ..do	103	Hypodermic injection of one drachm blood and pleural fluid of pig which died during the preceding night. Fluids full of actively moving bacteria.
	15 ..do	105.5	Snuffling.
	15 5 p. m.	105	
	16 10 a. m.	104.5	
	16 5 p. m.	104.5	
	17 10 a. m.	105.5	
	17 4 p. m.	103.5	
	18 10 a. m.	103.75	
	18 4 p. m.	105	
	19 10 a. m.	103.25	
	20 ..do	105.2	Blood shows moving bacteria, but less numerous than in the rabbit.
	20 ..do		
	21 10 a. m.	102.25	
	21 4 p. m.	104	
	22 9 a. m.	104	
	22 4.30 p. m.	105.25	
	23 9 a. m.	103.25	
	24 ..do	102	
	25 ..do	103	
	26 ..do	104	
	27 ..do	103.75	
	28 ..do	103.2	
	29 ..do	103.5	
	30 ..do	102.75	
	31 ..do	104	
Jan. 1	..do	103	
	2 ..do	103.75	
	3 ..do	103	
	4 ..do	102	
	5 ..do	103	
	6 ..do	103	Inoculated with scurf from the ear of a sick pig.
	7 ..do	102	
	8 ..do	102.75	Scours.
	9 ..do	103.8	Do.

EXPERIMENT No. 10—Continued.

Merino sheep—Continued.

Date.	Hour.	Body-temperature.	Remarks.
10	...do	103° F.	Scours. Anus red and sore. Strongly objects to the thermometer. Has passed bloody mucus.
11	...do	103	
12	...do	102	
13	...do	102.5	
14	...do	103.5	Anus still red and puffy, with abundant mucus.
15	...do	103	
16	...do	103.5	
17	...do	103.5	Scours.
18	...do	103	Do.
19	...do	104	
20	...do	102.75	
21	...do	103	
22	...do	102.5	Anus still red and swollen.
23	10 a. m.	102	Same afternoon injected one drachm of blood and pleural fluid from pig just killed. Fluids contained active bacteria.
24	...do	104	Slight subcutaneous swelling in the right axilla: Tenderness of the skin of the abdomen.
25	...do	104.5	
26	...do	104	
26	4.30 p. m.	105	
27	12 m.	105	
28	10 a. m.	103	
28	5 p. m.	104	
29	10 a. m.	105	
30	...do	104	

EXPERIMENT No. 11.

Long woolled (cross-breed) lamb.

Date.	Hour.	Body-temperature.	Remarks.
Jan. 17	10 a. m.	104.25° F.	Injected hypodermically in the axilla matter from the ears of two sick pigs, also anal mucus from one of them.
18	...do	104.25	
19	...do	103.8	
20	...do	105.25	
21	...do	103.5	Ears with scurfy eruption.
22	...do	106.5	Bleeding spots on ears.
22	5 p. m.	104.75	
23	10 a. m.	104.5	Injected hypodermically one drachm pleural fluid containing actively moving bacteria from pig just killed.
24	...do	108	Hard engorgement two inches in diameter in right axilla.
25	...do	107	Axillary swelling more defined; like a hazel-nut.
26	...do	104	
26	4.30 p. m.	108	
27	12 m.	108	
28	10 a. m.	105.25	Rectum contracted and tender; thermometer covered with bloody mucus.
28	5 p. m.	106	
29	10 a. m.	106	
30	...do	104	

REPORT OF DR. D. W. VOYLES.

Hon. WM. G. LE DUC,
Commissioner of Agriculture:

SIR: In conducting an examination of the diseases of swine, as prevailing throughout the State of Indiana during the present season, the following plan was pursued, viz:

A tour of observation and inspection was made through the counties of Floyd, Harrison, Washington, Greene, Morgan, Monroe, Owen, Put-

nam, and Bartholomew. Some of the most intelligent and leading stock men of each county were sought, and all the information obtained which they had upon the subject of the disease, both in regard to its present manifestation and past history. Speculators in live hogs and large feeders were closely interrogated upon every feature of the disease as coming within the range of their experience and observation. Diseased herds were visited, and in each case the farm minutely inspected in all its bearings upon the health of animals; the methods of breeding, feeding, and general management of swine diligently inquired into; dead animals, where not too far advanced in decomposition, dissected, and living ones, having the disease, were slaughtered for examination, and the pathological indications carefully noted. The month of September was entirely devoted to this branch of the investigation.

The object of this method of inquiry was to ascertain whether the disease, as prevailing throughout these several districts, was uniform in its character, differing only in such modification in type as may be due to local influences; or whether these were to be found separate and distinct diseases in different localities, due to entirely different causes for their production; and if uniformity was found to exist in the character of the disease as now prevailing, to learn from practical and intelligent observers in each district whether, in any essential particular, it differs from the disease that has prevailed in other years.

PREVALENCE OF THE DISEASE.

The several districts visited were all more or less affected by the disease, but to a much less extent than during former years, except, perhaps, in the county of Putnam, where it was prevailing for the first time as a general and wide-spread epidemic, the loss being estimated at from fifty to sixty thousand dollars. In this county the surface is sufficiently undulating to produce good drainage; the soil is red clay on limestone. Springs of pure limestone water are abundant, and woodlawns beautifully swarded with blue grass are seen upon almost every farm. Feeding swine has been an extensive and profitable branch of farm industry in this county, and the herds are, therefore, quite large for a grass-growing section. During the summer months hogs in this county run upon blue grass and clover, and are fed some corn. We found the corn so fed often unfit for use, because of a very reprehensible practice of hauling to the field for convenience in feeding and throwing it in an open rail pen, where, by exposure to heat and moisture, it soon becomes moldy. The mean temperature in this county during the summer was slightly above, and the rain-fall considerably below, the average seasons.

The counties of Floyd, Harrison, and Washington possess much the same kind of soil, and are abundantly supplied with running springs of limestone water; but blue grass and clover are not so extensively or generally grown. In these three counties hog-raising is not a branch of farm industry sufficiently remunerative to induce the farmers to generally engage in it, and the herds are, therefore, usually small and the animals very imperfectly cared for.

The observations made in the counties of Greene, Owen, Monroe, Morgan, and Bartholomew were on a line with the White River Valley. This and the Wabash Valley constitute pre-eminently the hog-growing sections of Indiana. It is in this part of the State that the disease has prevailed to the greatest extent. Hog-raising being the leading business industry, the herds are ordinarily quite large.

No observations were made in the Wabash country. In the White

River Valley the disease has prevailed during the present season to much less extent than for several years past. This is due in part to the fact that there are not so many hogs here as formerly—great loss having greatly discouraged hog-raising, a branch of agricultural industry heretofore paramount to every other interest.

The less prevalence of the disease is also due in part to the increased facilities for selling to summer packers; the approach of the complaint in any given locality being the signal for the selling of every marketable animal.

In these hog-growing districts, the surface of the country is quite flat, affording very imperfect natural drainage, and as a consequence much stagnant water prevails. The soil is a mixture of clay and sand. The food is mainly corn, with some clover during the summer months, the animals often subsisting upon corn alone from the time of birth to that of slaughter.

In the county of Bartholomew there are several "grease factories," where they render dead animals, and it is estimated that during the year 1876 there were rendered at these several factories no less than one hundred thousand animals that died of the disease in that and adjacent counties.

It is the concurrent testimony of the leading and most intelligent observers, whose experience and observation have been most extensive, that while the disorder prevails more or less at all seasons of the year, it prevails to the greatest extent and with most fatal effect during the dry months of the fall season, and again during the last winter and first months of spring—February and March.

SYMPTOMS OF THE DISEASE.

A greater degree of uniformity was found to exist in the symptoms and character of the disease than was anticipated at the beginning of the investigation. The first symptoms that usually attract the attention of the farmer, indicating approaching disease, is a wheezing cough, coupled with a disposition to mope. During this period the animal stands about as if in a "brown study," with its ears dropped and its eyes inclined to water or matter.

Following in the usual succession of symptoms comes a failure in the appetite, with occasional vomiting and diarrhea, although the two last-named symptoms constitute an exception, to which constipation is the rule.

A complete failure in the appetite, intense thirst, with increased temperature of the body, indicates the supervention of the febrile and inflammatory stage of the disease. During this stage the temperature not infrequently rises as high as 107° F., as indicated by the introduction of the thermometer into the rectum of the animal. The cough increases; the breathing becomes more accelerated and laborious; the respiratory movements are scarcely observable in the walls of the chest, but become conspicuous at the flank, and range from 30 to 60 inspirations to the minute; the arterial circulation is increased in frequency and diminished in volume. Petechial eruption is often observed on the skin and is most distinctly observable on white animals. This is due to extravasated blood from the capillaries into the tissues, which, on undergoing decomposition, produces ulceration of the skin in the future course of the disease, particularly if the animal becomes convalescent.

In the last stage the animal becomes very weak; staggers in gait, if able to rise at all; refuses both food and drink; falls in temperature,

sometimes as low as 60° F.; seeks the sunshine or a covering of litter, and speedily dies. Emaciation is a rapidly progressive symptom throughout the entire course of the disease.

DURATION OF THE DISEASE.

The disorder is by no means uniform in its duration, varying from a few hours to many days and even weeks. When death occurs only a few hours after the attack a complication of heart disease is usually the cause of the rapid termination of the case. Early fatality may occur also from rapid congestion of the lungs, producing hepatization of a large portion of that organ. The average duration of the disease can be, therefore, scarcely approximated. Perhaps five days would include the length of time consumed in most fatal cases, whereas a much greater length of time is required in cases that recover. In its most violent epidemic form a much less time than five days would include the course of the disease in all fatal cases.

PATHOLOGY OF THE DISEASE.

As before stated, all dead animals not too far advanced in decomposition were examined, and one or more sick animals were selected from each diseased herd, and after a careful study of their symptoms, as compared with the other sick stock of the herd, were slaughtered for examination.

Memoranda from thirty dissections made from fifteen separate and distinct herds fairly representing the disease as observed under all the varied circumstances as to food, soil, water, and general management, show the following results:

In every case, without exception, disease of the lungs was present, varying in degree from slight congestion to complete softening from suppuration and inflammation. In two cases the lung disease was tuberculous in character. In eight cases adhesion occurred between the costal pleura and lung. In six cases circumscribed spots of inflammation were found on the walls of the heart and its investment, with an effusion in the pericardial sack. In six cases were small patches of ulceration of mucous lining of large intestine. In six cases were congestion of mucous lining of the stomach. In all cases the liver presented a darker hue than natural, in four cases slightly, and in one greatly enlarged; but in all other cases in size and general appearance would compare favorably with that organ as usually observed in animals regarded sound and healthy. The spleen was in all cases discolored, as in case of the liver. In few cases there was slight congestion of the kidneys. In one case there was evidence of fatty degeneration, and in all others the organ indicated a healthy condition. The blood was always dark-colored, the muscles pale and relaxed.

The disease of the lungs was in all cases the leading pathological condition, to which all other diseased appearances were secondary in importance, constituting complications only.

A section of the lung of an animal slaughtered during the active inflammatory state of the disease shows, under the microscope, a complete solidification of lung-tissue, the air-cells being filled with epithelial exudation, no extravasated blood appearing. A section of the liver of the same animal shows a thickening of the septæ acini by a proliferation of epithelial cells, tending to or constituting fatty degeneration; other acini in the same section exhibit a perfectly healthy condition. A sec-

tion of intestine from same animal shows a healthy condition. These three sections are transmitted with this report for verification. (See microscopic sections, Plate XV, Figs. 1, 2, and 3.)

The contents of the stomach and intestines were liquid in six cases, and dry, hard, and very dark colored in all others.

The gall-bladder usually contained a small quantity of thin, greenish fluid.

The trachea and bronchial tubes contained a large quantity of matter apparently consisting of mucus and broken-down epithelium.

DIAGNOSIS OF THE DISEASE.

Judging from the visible causes that appear most active in its development—the symptoms and pathology of the disease—we feel warranted in pronouncing it, in its milder manifestations, *bronchial catarrh*, and, in its most active and fatal form, *catarrhal pneumonia*.

There is no symptom uniformly present in the disease, as we have observed it, that bears any analogy to the symptoms of cholera as affecting the human subject, and the term “hog-cholera” is therefore a misnomer; and although there is, ordinarily, little or nothing in a name, in this instance the misnaming of the disease has been a source of incalculable loss, by suggesting a line of treatment irrationally administered and calculated to aggravate rather than cure it.

ITS CAUSE.

It is when seeking the cause of this wide-spread epidemic disease that the field of investigation takes widest range. As already stated, it prevails more or less at all seasons of the year; and under almost every conceivable condition and combination of conditions as to soil, food, water, locality, and general management; but the difference in its prevalence under certain circumstances is so marked and uniform that from these facts we may derive some definite information as to the causes *most* active in development.

The past history of the disease would indicate that it originated in this country at a time when the condition of swine was visibly altered from a comparative state of nature to one of more perfect domestication. When the country was new, affording almost unlimited range, the hogs bred, grew up, and roamed in the forest until maturity. Being allowed the free use of their noses, and being omnivorous in nature, they fed on worms, roots, mast, and such other food as was provided and given them by their owners; they exercised as their inclination or necessities inclined them; had free access to numerous springs and streams of running water; slept in storm-sheltered thickets on beds of clean leaves, and enjoyed under these circumstances a vigor of constitution and an immunity from disease unknown to the modern swine-breeders of the country. As the country became more densely populated, rendering it necessary to clear up and inclose the land for agricultural purposes, the lank, active, long-nosed animal of the pioneer age began to disappear in order to give place to a new and more advanced civilization in the history of his race. A close business calculation demonstrated that a hog fed to profit on food produced by manual labor must have an inbred tendency to take on flesh, and that tendency encouraged by close confinement and high feeding.

The hog of to-day is the result of persistent in-breeding for an obese habit, encouraged by want of exercise and over-feeding. An animal

SWINE FEVER.

Report Commissioner of Agriculture for 1878.

Plate XV.

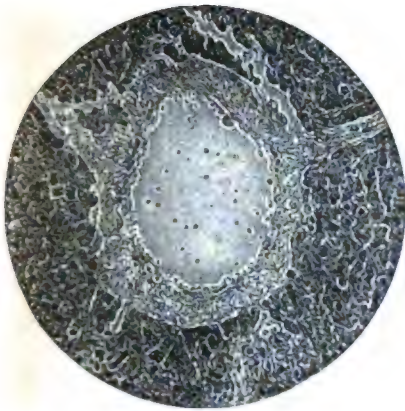


Fig. 1.
Microscopic section of diseased liver
in "Hog Cholera."

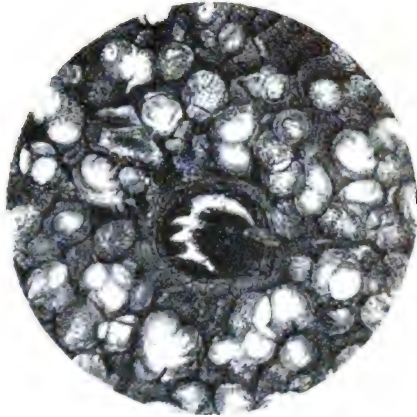


Fig. 2.
Microscopic section of lung
in catarrhal pneumonia.



Fig. 3.
Microscopic section of intestine in "hog-cholera," showing healthy condition.



quite comely in shape, early in maturity, of strongly-developed fattening tendencies, and of enfeebled constitution, is the intelligent and natural result. An animal thus deprived in part of the constitutional vigor of its ancestors, forced to give in part the instinctive habits of its race in obedience to the regulations of modern farming, must necessarily have acquired a diseased tendency. If, under these circumstances in the era of modern swine-breeding, the animal is more exposed to causes producing disease, a general prevalence of disease must be the result. Do such causes generally prevail, which, operating upon well-known principles in animal physiology, are calculated to produce the disease as we have observed it? If not, we are forced, in the absence of visible and rational causes, to indulge in hypothesis, and seek some hidden poison which, operating to produce the disease, may, therefore, propagate it by contagion.

We have assumed that the animal of the present period is one of impaired constitution, and that its habits, as imposed by the will of the farmer, as to food, water, cleanliness, exercise, and rest, do not approach so nearly a strict observance of the laws of health as do the instinctive habits of the animal in an unrestrained state of nature. The habits in the latter state have been briefly alluded to already. What are the altered conditions that conflict with the laws of health as imposed by the former state?

FOOD.

In considering this branch of the inquiry we will examine briefly the subject of food. The hog is an omnivorous animal; he eats both animal and vegetable food; his instinct demands and his health requires it. In his native state he obtains the animal food required by the industrious use of his nose in digging for worms and insects; but the most improved methods of modern swine-breeding have proclaimed the nose of the hog a useless appendage, and bred it to the smallest possible size—a thing of beauty to adorn a ring. The animal, thus deprived of the natural means of obtaining a supply of animal food, is forced to subsist almost exclusively upon vegetable diet, consisting almost wholly of corn. That this style of feeding long pursued is not conducive to the highest state of health would seem self-evident. In the hog-growing districts, corn alone is often the only food fed to swine from birth to slaughtering, and it is in these districts that the disease is most prevalent and fatal. On the contrary, hogs fed the offal from milk and cheese factories, or from city and hotel garbage, are always most free from disease. In the city of New Albany, Indiana, there are more swine to the square mile than elsewhere in the State; their rights are somewhat sacred; they run in every street, sleep in every alley, and break into almost every yard; as scavengers they constitute a sort of independent body of health police, auxiliary to the board of health; the average councilman regards them in some sense as his constituency, and the people, therefore, have vainly prayed for hog-ordinances and hog-cholera, and still the animal feeds upon our bounty, multiplies his race, and almost defies disease.

WATER.

During the dry months of the fall season it seldom happens that hogs have a proper supply of good pure water, even in well-watered districts of country. In all the herds examined where the disease prevailed, in but one instance was a proper supply of pure water observed; in a large number of cases there was positively no water, only thin mud at the

watering place. At the farm of Mr. Quinn, near Hartsville, Indiana, where the disease was prevailing, twelve head of sick animals were running in an inclosure, and when the proprietor was asked about the supply of water, he said, "There was plenty—a good spring." On personal examination the spring was found to issue from a hill-side, with but little incline; from the place where it issued to the point where it disappeared from exhaustion—a distance of some 40 feet—there was a long bed of thin mud, and no visible appearance of running water at any point. He was asked on our return when he last inspected the watering place, and answered, "This morning." He was then asked if he thought the supply of water at that spring would supply a few horses or cattle with water, if the hogs were taken out, and he replied promptly in the negative, and when asked by what process of reasoning he came to the conclusion that water of acknowledged unfitness for anything else was quite good enough for hogs, and sick ones at that, he replied, in substance, that hogs would not use water until they rendered it unfit for any other kind of stock!

We mention this case in detail because it fairly represents the views of the average farmer upon the subject of water for swine—"any water is good enough for a hog."

CLEANLINESS.

The domesticated animal does not approximate the habits of his pioneer ancestor in point of cleanliness. It is the instinctive habit of the animal to bathe in water and wallow in mud to counteract heat and as a protection against flies; but in a state of nature, when the mud has served its purpose, the animal cleanses himself by friction with the nearest tree; the filthy bed which the domestic animal becomes satisfied to occupy in a state of confinement is never occupied by animals running in the forest, and given opportunity to make and change their sleeping places at will—in short, when allowed to provide for his own existence, he exercises a more intelligent regard for his wants than is ordinarily exercised for him by his owner, who attempts to supersede instinct by reason.

The frequent allusions made to the native hog may provoke the inquiry, Are we to return to the ill-shapen and ungainly animal of forty years ago? Certainly not. In this age of high-priced corn, such an animal is unworthy of an existence. The only thing to be admired of him is his health and constitution; the only useful lesson to be derived from allusion to his history is the means by which these were acquired and maintained. Food, faulty in character and wanting in variety; water, deficient in quantity and purity; quarters, too limited in space and filthy in condition, are the three leading factors in the production of disease of swine.

Special attention was given to the examination of the surface land occupied by diseased animals, and while there were exceptional cases, in quite a large majority of instances they were running in fields producing quite a luxuriant growth of weeds which, during that season, were shedding their seed, bloom, and leaves. The earth was exceedingly dry and dusty. In traveling through the fields the animals created a dust from the earth and from the weeds also, which, together, were taken into the air-passages and lungs with the air breathed, constituting an active source of irritation. While pursuing this branch of the inquiry we were informed by some intelligent observers that they had noticed that animals running in such fields, particularly wheat and rye stubble, over-

grown with weeds, were the most unhealthy; and under these circumstances the greatest amount of disease was observed. It is at this particular season of the year that hogs are most neglected. Having been turned out during the summer months to take care of themselves, while the grass is green and filled with nutritious qualities, they thrive and do well; but, at the approach of the dry season, green grass gives place to that which is mature and dry, in which state it is indigestible and constipating. The water at this particular season fails. It is also at this season that swine keep their skin clothed with mud as a protection against flies, seriously interfering with its healthy functions as auxiliary to the lungs and other depurating organs of the body. This is the season when the cold nights precipitate heavy dews, and while running through the grass and weeds, during the nights and early morning hours, the animals become wet and cold, to be dried off and scorched in heat and dust at the returning noonday. During the nights they are chilled, sending the blood from the surface to the internal organs of the body, and breathe a damp, cold atmosphere; during the day they are overcome with enervating heat, and breathe a dry atmosphere, loaded with dust and dry particles of decaying vegetation. Is not this an array of existing circumstances well calculated to excite catarrhal affections, and are not these conditions as universally present over a large area of country as the disease itself? It may be objected that the disease sometimes prevails where the conditions mentioned are wanting. That it does prevail in some instances where there is no visible cause for its production is true, but the instances are of rare occurrence. As before stated, it prevails again in an active and fatal form during the months of February and March. This is the season when bronchial and lung diseases prevail among the human family, due to the atmospheric changes, and exposure to the damp earth then in a state of alternate freezing and thawing. Swine are similarly affected during that period of the year from the same cause; and being more generally exposed to these causes than the human family, are more liable to such diseases in their epidemic form. The principal objection to this rational theory of the cause of the disease is that it is found to exist at other seasons of the year than those mentioned, and under circumstances where almost all the conditions named are wanting. In a few instances we observed it where there was no visible want of first-class care in the management of the swine as to food, water, cleanliness, and shelter, and when they were running on clean blue-grass pastures well shaded and watered; but the prevalence of the disease under such circumstances *was exceedingly rare*. It is the general opinion among farmers that the disease is due to some specific poison, and is contagious in character. This opinion was generally entertained by the farmers of Putnam county, where the disease prevailed this season for the first time as a general and widespread epidemic. Many claimed that the disease was communicated by a lot of diseased swine driven through that county from the county of Boone; but many cases occurred on farms entirely off the route traveled by the diseased animals, and entirely isolated from public highways, and upon which no new or strange animals had been introduced by purchase or otherwise. A toll-gate keeper living near the village of Bainbridge, in that county, had a few swine running at large, and coming in close contact with all the animals driven over the road, and still they had escaped the disease; while those occupying inclosures by the roadside generally had it. Numerous instances were reported by reliable and intelligent men, where the disease prevailed upon one farm with but a partition fence separating the sick animals

from those of a neighbor, in an adjoining field, and the latter not be affected by it. No case of this kind was reported, where a stream of water led from the diseased herd to the opposite lot of animals, in which the latter escaped; which circumstance would indicate that while the disease may not be strictly contagious it becomes infectious, and can be transmitted by contact with diseased matter. Experimental operations conducted with a view to ascertain this fact were wanting, because of the lack of absolute knowledge that the animals operated upon would not have had disease without the introduction of diseased matter by inoculation; barring this doubt, the introduction of diseased matter into the system of a well animal produces the disease in four out of five cases. It is a safe practice to separate the sick from the well animals at the very first indication of approaching disease. The eating of the flesh of the dead animals, dying of the disease, by those surviving, is a very reprehensible practice, and should under no circumstance be allowed. The dead should be speedily removed and buried or cremated. Some farmers, however, claim that where they allowed the sick to eat the dead the animals seemed to recover faster by the practice—an observation, if correctly made, only demonstrating that the herd was suffering from want of animal food to such an extent that that furnished them in a diseased condition did them more good than harm. Those holding to the theory of contagion generally agree in the period of incubation as ranging from ten to twelve days.

Mr. William B. Taylor, of Martinsville, Ind., a gentleman of long experience as a feeder and packer, and an intelligent observer of the disease, states that when a herd of diseased animals were turned in a field with others not previously exposed, that the disease would almost invariably run through the entire diseased herd before attacking the others; and Mr. Joseph Goss, of Gosport, Ind., a feeder and packer of forty years' experience, and a most careful and intelligent observer, corroborates the statement of Mr. Taylor.

THE DISEASE AS AFFECTING DIFFERENT BREEDS.

This branch of the inquiry was forced upon our attention by certain parties who claimed in behalf of certain breeds of swine a partial or complete immunity from the disease. Unfortunately our field for observation in this regard was not good, since all the animals observed were grades in which the Poland-China and Berkshire blood largely predominated. The best information gained upon the subject was to the effect that the breeds for which such immunity was claimed were those not in general use, and that the absence of loss from such breeds is due to the small number of such animals existing in the diseased districts. Such claims were made in behalf of the Chester Whites and Jersey Reds. We saw none of either of these breeds in our travels, either sick or well. The latter breed may have a partial immunity from these considerations. It is an Eastern bred animal, developed in a section where in-breeding, close confinement, and over feeding and monotonous diet are not so generally practiced as in the West, and that breed has, therefore, *possibly* a better constitution with which to resist diseased tendency.

RECURRENCE OF THE DISEASE.

All experienced feeders agree in the opinion that animals having the disease and recovering from it seldom have a second attack, and state that in purchasing animals to feed preference is always given to those

that have gone through with the disease. We are inclined to accept this opinion as of little consequence, for the reason that such as are fed for pork do not afford a sufficient lapse of time to clearly demonstrate this point; and, on the contrary, among breeding animals that are allowed to live older, in which timely opportunity is given, our information is that a second attack is not an unusual occurrence.

HEREDITARY EFFECT OF THE DISEASE.

Females having the disease when breeding almost invariably cast their young. If they escape that accident, the offspring usually die very soon after birth. Subsequent litters from the animal, after completely recovering from the disorder, do not appear to be wanting in vigor, and do not exhibit a greater aptitude for the disease than other animals.

PREVENTION OF THE DISEASE.

The widespread prevalence of the disease, its rapid course and dreadful fatality, warrant the opinion that measures of prevention, if discovered and applied, will be much more beneficial in result than the discovery of a successful line of treatment for the disease, unless that treatment shall consist of some specific remedy, a practical use of which can be made by the farmers in all stages of the complaint. That such a remedy will be discovered, we are of opinion, is not within the range of probability. The measures necessary to prevent disease in domestic animals embrace within their range a careful study of their natural habits and wants, and a strict observance of the laws of health that govern all animal life, the principles of which are the same in their application to the inferior animals as to man. Those errors alluded to when considering the cause of the disease, as, in our opinion, largely contributing to, if not wholly the cause of, its development, must be corrected. The idea that swine are exempt from the ordinary laws governing health, and will thrive under any and all circumstances, must be abandoned. Forced to keep pace in his superior development with the civilization of the age in which he lives, he requires additional care in his management in order to ward off the numerous ills to which he is liable, many of which were unknown to his race in its unimproved state of nature. The food of the animal should, at all times, consist of the greatest possible variety; the water drunk should be strictly pure; too many animals should not be herded together; the young animals should be kept to themselves; frequent change of locality, by shifting from one field to another; the frequent plowing up or burning over of the lots usually denoted as hog-lots in order to disinfect them; frequent change of sleeping-places, and the removal and destruction of old, filthy bedding-material. During the dry fall months, when the swine are running at large, they should be daily inspected, and at the approach of that period when the succulent grass is giving place to the mature and dry, laxative food, such as bran-mash or oil-cake; or aperient medicine, as linseed-oil or Glauber salts, given to counteract the constipating effect of the dry grass; the watering-places daily inspected; if running in open fields with high weeds and grass, they should be taken out at night and kept from the cold, wet grass, and turned into woods, if there is such a place available; they should be kept from weedy and stubble fields during the dry dusty period of the fall season, both day and night. When confined in close pens, these pens should be cleaned daily, and disinfected when there is stench, by the use of copperas, chlorinated lime, or with dry,

fresh dirt. The opinion that corn, almost alone, is sufficient food for swine, and contains all that is necessary for the growth and development of the animal, will not be abandoned by the average farmer until after many costly lessons from experience, while attempting to freight their corn crops to market through this uncertain medium of transportation. A judicious and intelligent system of in-breeding cannot be abandoned without a rapid reversion to the ill-shapen animal of forty years ago, and we do not insist that in-breeding, when judiciously and intelligently practiced, is materially deteriorating in its influence upon the health and constitution of swine; it is only by coupling animals near related, that have a constitutional defect or a diseased tendency, and where these defects and tendencies are duplicated, that such a course becomes positively injurious. In the natural state of swine, when running at large and growing up without man's intervention, in-breeding frequently occurs; and the bad tendencies are warded off by the more vigorous males fighting off or destroying the feeble ones and becoming the sires of the race. Thus nature provides for a "survival of the fittest." In artificial breeding, the selections made for breeding purposes are too often made with special reference to shape and beauty, and too little consideration is given to vigor and constitution. There is no practical test made in the prize-ring between the most comely male and his less handsome brother, as to which is by nature best entitled to become the sire; but the breeder makes the choice from other considerations than "might makes right." Good feeding is the counterpart of good breeding; but there is a marked difference between good feeding and overfeeding or stuffing. Good feeding consists in giving an amount of good healthy food in sufficient variety to provide for the waste of the body, and in quantity only sufficient to develop the future growth of the animal. Overfeeding or stuffing consists in pushing the amount of food to the full assimilative capacity of the animal, with a view to the greatest possible amount of excessive flesh. The first is essential to good breeding; the other is deteriorating to the constitutional vigor of the animal.

TREATMENT OF THE DISEASE.

This branch of the subject we might sum up in these few words: No remedy was discovered having any marked beneficial effect upon the disease when once fully established; no farmer was found who ever in his own experience tried any remedy or remedies that seemed to exert any well marked curative effect upon the disease. Many isolated cases were reported; one animal recovered by having the tip end of its tail cut off; two, by being saturated with coal-oil, and a few others of like absurdity.

The announcement of the names of the individual members of the commission appointed to conduct this examination brought to our notice by letter a large number of so-called hog "cholera cures," which their several proprietors asked us to test, or allow them to test in our presence. As the requests were coupled with the expressed or understood condition that in case said remedies proved efficient cures their proprietor should have the benefit, for his private use and gain, of an official indorsement of the remedy, we did not think the investigation of such remedies for such purpose came within the range of duties properly devolving upon a commission appointed to make an investigation at the public expense for the public good, and therefore declined to answer all communications relating to such subjects. What valuable discoveries left in temporary obscurity by our course in the matter time alone must

disclose. We must say that in this matter we were not influenced by a strict regard to the observance of a high-toned professional code of medical ethics, but entirely from a sense of the proper discharge of a public duty. The sick herd of Mr. Quinn, previously alluded to, was taken as one offering a fair opportunity for treatment. The sick animals were all in the formative stage of the disease, and surrounding circumstances seemed favorable to their cure. They were confined to proper limits, in a pen well situated as to health and comfort, and were given a dose of purgative medicine as a starting point, consisting of Glauber salts. It was observed by all with whom we conversed that a larger per cent. of recoveries occurred from among those animals that at the commencement of the disease had vomiting and diarrhea than from others. The dry and hard condition of the fecal matter found in the animals dissected leads to the belief that purgatives at the commencement of disease would always be a judicious course. Bromide of ammonia was then given in solution in doses of 30 grains every six hours. This remedy we tested at the suggestion of the Agricultural Department, at the instance of a gentleman who insisted that inasmuch as it exerted a salutary effect in the disease of cholera as affecting the human subject, it might prove equally beneficial in such disease in swine. So it might, but we did not find that an analogous disease, and therefore the remedy having no properties calculated to meet the character of the disease that *we did find*, proved of no practical benefit in its treatment, the animals dying in about the same proportion as when not subjected to any plan of treatment, but left entirely to themselves. Mr. Stadda's herd, in the same county, was subjected to the same plan of treatment with the same results. The herd of Mr. Thomas, in Harrison county, was treated under our direction by giving a mild purgative at the commencement of the disease, and during the acute inflammatory state of the complaint administered antimonials as a sedative to the circulation, and in the second stage tonics and nutritious food of milk, mill-feed, and vegetables, but the per cent. of deaths remained much the same as when not treated. Other isolated cases occurred under circumstances where extra care and effort was made in trying to effect a cure by several different lines of treatment, but candor compels the admission that as far as relates to the discovery of any plan of treatment proving sufficiently efficient to entitle it to respectable consideration, our efforts were without good results. And, lest our speculations and theories as to the proper line of treatment may be wrong, and present further obstacles in the way of the discovery of a successful remedy, we will refrain from giving them, preferring to present such points only as we fully believe will be of practical value.

I remain, very respectfully, your obedient servant,

D. W. VOYLES, M. D.

NEW ALBANY, IND., November 23, 1878.

REPORT OF D. E. SALMON, V. S.

Hon. WILLIAM G. LE DUC,

Commissioner of Agriculture:

SIR: In my investigations of the contagious hog-fever as it exists in North Carolina, it has been my endeavor to decide those points which it was indispensable for me to know before adopting preventive measures, rather than others which might be equally interesting from a scientific standpoint. What is the percentage of loss from swine disease in

this State? Is it one and the same disease from which the hogs are dying in the different parts of it? If but one, what are its symptoms, *post-mortem* appearances, nature, and cause? And what are the means by which such losses may be diminished or entirely prevented? These are the questions which it seemed most important to answer; they are those to which my time has been entirely devoted.

It was found very difficult to obtain information of localities in which the disease existed; for although requests were made through our newspapers for such information, and although, as I have since learned, swine were dying largely in every section of the State, I received during the whole time but three letters naming such localities. If to this we add that a large part of this State is without railroads; that the farms are large, and, consequently, the country is thinly settled; that usually but few hogs are kept on each place, it is seen that a great part of the time must have been spent in unproductive work in searching out infected localities, and, when these were found, in traveling from farm to farm to find herds suitable for experiment, or dead animals for examination. These facts must explain the small number of experiments which I was able to carry out.

To give a connected view of the subject, and one convenient for reference, the report is presented under the following headings:

I.

THE LOSSES OF SWINE.

- a. Extent of disease, number and percentage of deaths.
- b. Are the great bulk of these losses caused by one disease, or are they more equally distributed among all those to which these animals are subject?

II.

THE CONTAGIOUS HOG-FEVER.

- a. Symptoms.
- b. Post-mortem appearances.
- c. Nature.
- d. Cause.

III.

MEANS OF PREVENTION.

- a. Hygienic and medical treatment.
- b. Sanitary regulations.

EXTENT OF DISEASE, NUMBER AND PERCENTAGE OF DEATHS.

North Carolina is a State with a great diversity of soil and climate. In the western or mountainous part the summers are not excessively hot nor the winters extremely cold, and, with the exception of river bottoms which are of comparatively small extent, the soil is rolling and naturally well drained; the water is good; there is no malaria, and the country is rightfully considered a very healthy one. Extending from the mountains for two hundred miles eastward is a strip of country much of which is not sufficiently rolling for good drainage through the compact subsoil, and in a large part of which intermittent fever prevails to

a considerable extent among people. Still farther east is a strip of sandy and swampy country, extremely malarious, and very subject to intermittent fever and other diseases of malarial origin.

Now, if our hogs were dying of unhealthy surroundings; if their disease or diseases originate to any extent from malarious emanations, it is certainly in this eastern belt that we should expect to find by far the largest percentage of losses. We should not be disappointed in finding a few in the central belt, but in the healthy, elevated west, where the hogs roam in vast mountain forests, we should certainly expect an unusual freedom from disease, especially in summer. Viewing the matter from this standpoint, I visited the western and central sections, and would have gone to the seaboard if my own health had not failed me at this point.

Fortunately statistics have been collected of the number of deaths among swine in the different parts of the State for the year ending April 1, 1878, and these, as far as can be obtained (twenty-three counties only out of ninety-four), are as follows:

Counties.	Total number of swine.	Number of deaths.	Counties.	Total number of swine.	Number of deaths.
Bertie	22, 288	5, 151	Lenoir	16 604	3, 853
Buncombe	12, 076	3, 194	McDowell	8, 011	2, 363
Burk	6, 341	1, 940	Martin	12, 755	8, 670
Camden	5, 586	2, 158	Mitchell	8, 972	1, 380
Chatham	27, 858	9, 103	Pender	14, 964	1, 977
Cherokee	5, 183	538	Person	12, 789	8, 084
Clay	4, 908	1, 286	Richmond	10, 030	1, 192
Craven	11, 448	3, 493	Robeson	27, 411	3, 764
Cumberland	13, 466	2, 006	Rowan	14, 409	1, 943
Currituck	7, 064	2, 451	Wake	17, 448	4, 112
Franklin	16, 045	6, 359			
Guilford	22, 392	1, 041	Total	304, 492	66, 946
Hyde	8, 358	888			

That is to say, hogs have died to an alarming extent from Cherokee, Mitchell, and Buncombe counties in the mountains, to Camden, Currituck, and Craven on the seaboard. Nor was the year above reported an exceptional one, as these losses are now being repeated in Haywood and Yancey in the west, and from thence in localities eastward to the sea. Speaking in round numbers we have reports here from one-fourth of the counties in the State, and these counties in 1870 contained about one-fourth of the hogs in the State, and contain now very nearly the same number as then. We may, therefore, estimate the losses in the entire State at four times the number in these counties, say 260,000. Taking the counties mentioned, the loss amounts to $21\frac{1}{2}$ per cent. of the whole stock, and ranges from $38\frac{1}{2}$ per cent. in Camden to only $4\frac{1}{2}$ per cent. in Guilford.

ARE THESE LOSSES THE RESULT OF A SINGLE DISEASE ?

This question has been raised again and again, whenever any measure has been proposed for diminishing the death-rate of these animals, and notwithstanding investigators in widely different localities have observed similar symptoms and similar *post-mortem* appearances, the great objection to sanitary laws has always been the uncertainty in regard to the affection or affections from which death occurred. It, therefore, seemed advisable to visit a large part of the State in order to decide this question of primary importance. The disease was seen by the writer in Haywood, Buncombe, and McDowell counties, in the mountain district,

in Rowan, Mecklenburg, Lincoln, Gaston, and Alamance, in the central belt, and particular inquiries were made of those who had observed it in the counties bordering on the coast. Several counties not enumerated above were visited, but I was not successful in finding infected localities. My greatest regret is that I was not able to make personal observations in every part of the State.

In each of the counties mentioned a considerable number of herds were visited and examined, and without exception the living animals presented similar symptoms, and the dead ones showed similar changes in the different organs of the body. Slight variations were of course observed, as is always the case in any disease, but these were as great between different individuals of the same herd, sick at the same time, as between different herds, even in different counties. And, what is of great importance, I did not find a single case in which it could possibly be supposed that death resulted from a local disease; but in every case a variety of organs, belonging to different apparatus, were found diseased; the blood often showed marked changes; there were extravasations in various parts of the body, and always inflammation of the lungs and large intestines, generally, also, of the heart, and often of the eyes; the skin, too, was often plainly affected, and the temperature was found to be increased before any other symptoms of disease were in the least apparent.

Considering all these facts, there can be no doubt that these animals all died of a general disease—a disease not caused by changes in any single organ; but, on the contrary, a disease which caused the various organic changes observed. Again, from the similarity of symptoms in all these cases which I saw, and in those reported to me from other parts of the State, and from the correspondence in *post-mortem* appearances, there can scarcely remain a shadow of doubt that the great mass of the hogs dying in North Carolina are affected by one and the same disease.

SYMPTOMS.

An increase of temperature precedes for an undetermined and probably variable length of time the appearance of all other symptoms. In one lot of seven ten-months-old pigs, only one of which showed symptoms of disease, the six remaining had a temperature varying from 103.6° F. to 106° F., and this temperature was preserved unaltered for six days, with no other changes in the condition of the animals than increased dullness of the eyes, a general unthrifty condition and a disinclination to search for food, although the appetite was still good. The pig first affected died about this time, and a *post-mortem* examination left no doubt of the disease.

In another lot of ten three-months-old pigs, but one of which was plainly sick, six had a temperature ranging from $104\frac{1}{2}^{\circ}$ F. to 107° F.; with one this was $103\frac{1}{2}^{\circ}$ F., with two 101° F. and 102° respectively, while with the sick one it reached 107.4° F.

In a herd of twelve, from which one had just died, and one was plainly sick, four others showed a temperature from $103\frac{1}{2}^{\circ}$ F. to 107° F.

In a lot of fourteen animals, one had died, one was plainly sick, and three others had a temperature from 103° F. to 104° F.

Of five pigs, one had just died, three had a temperature of 105° F. to 106° F., and the remaining one 103° F.

Of eleven hogs, two had died, one was plainly sick, and five had a temperature ranging from 103° F. to 106° F.

From these and similar cases it has seemed probable that a high tem-

perature may exist several weeks before other symptoms are manifested, or even that the disease may in some cases be confined to, and run its course in, the blood, without a localization in any organ or organs. Such a view is also sustained by the often-observed fact that when the cholera exists in a herd, animals, which show no positive signs of sickness, are found in an unhealthy condition, and cannot be made to thrive and fatten. This point, however, remains to be cleared up by future investigations. An objection may be brought to the lower temperature here recorded, that according to other observers it is common to find a temperature of 103° F. to 104° F. in healthy animals. This, however, does not agree with the observations which I have been able to make. In one herd of ten, the last of a much larger number which had been reduced by this disease, all of which appeared healthy and thriving, not one showed a temperature by my thermometer as high as 103° F. In several other herds of healthy animals which I examined, but notes of which were not preserved, the temperature was found to range from 96° F. to $102\frac{1}{2}^{\circ}$ F. In nearly all these cases the animals were called up from fields where they were running at liberty, and were immediately examined. So that, although there may be differences in thermometers, I think there can be little doubt from these observations that an increase of temperature precedes other symptoms by a number of days.

The first symptoms apparent externally are a dullness of the eyes, the lids of which are kept nearer closed than in health, with an accumulation of secretion in the corners; there is hanging of the head with lopped ears, an inclination to hide in the litter, to lie on the belly, and keep quiet; as the disease advances there is considerable thirst, more or less cough, a pink blush, rose-colored spots, and papular eruption on the skin, particularly along the belly, inside of thighs and fore-legs, and about the ears. There is accelerated respiration and circulation, increased action of the flanks in breathing, tucked-up abdomen, arched back, swelling of the vulva in the female, as if in heat; sometimes, also, of the sheath in the male; loss of appetite, and tenderness of the abdomen; occasionally there was persistent diarrhea, but generally obstinate constipation. In some cases large abraded spots are observed at the projecting parts of the body, caused by separation and loss of the epidermis; in these cases a slight blow or friction on the skin is sufficient to produce such abrasions. In many cases the eruption, blush, and spots are entirely absent; petechiæ were formed in about one-third of the cases; in one outbreak, chiefly confined to pigs in which the eruption was remarkably plain, there was considerable inflammation of and discharge from the eyes. Some animals have a very disagreeable odor even before death. In nearly all cases there is weakness or partial paralysis of the posterior extremities, and occasionally this paralysis is so complete in the first stages of the disease as to prevent walking or standing.

The percentage of animals affected and the violence of the symptoms vary greatly, according to the time the disease has existed in a locality. In the early part of an outbreak from 70 to 90 per cent. die, and most of these in the first stages of the disease, from deterioration of the blood or apoplexy. In one case there was a loss of 102 out of 107 head; in other cases whole herds of 30 or 40 succumbed; later, many of the animals linger for weeks, and finally die from persistent lesions of the lungs or bowels. In some instances a considerable number of those affected—20 to 25 per cent.—recover; many of these lose all their hair, and often the epidermis as well. Of those recovering, a very few fatten rapidly and do well, but by far the greater part cannot be fattened, and are always unthrifty and profitless animals.

POST-MORTEM APPEARANCES.

In about one-third of the cases petechiæ and larger blood extravasations are seen on the thinner parts of the skin; in a somewhat larger proportion of cases the abraded spots, already mentioned, are present; making a section through these, the skin appears thickened and of a very high color, but the sub-cutaneous tissue is not appreciably altered. In one or two cases there was no effusion in the abdomen, but in all the rest this cavity contained a variable quantity of liquid—sometimes of a bright yellow color and clear, sometimes of a straw color, and very often turbid and mixed with the coloring matter of the blood. In every case the colon and cæcum were plainly affected, reddened externally, and internally showed changes varying from simply a deep coloration to inflammation and great thickening; in some cases they were studded with petechiæ, in others there were none; ulcers of various sizes were frequently found, and also thickened fibrous, concentric patches, occupying sometimes nearly the entire walls of these organs. In one case there were large blood extravasations in the walls of both colon and cæcum, distending them to a thickness of half to three-fourths of an inch; on section, these spots had the appearance of a clot of black blood; they were firm and tough and did not yield to scraping with a knife. Round, firm nodules, one-half inch in diameter, were frequently found in the walls of these bowels, which, on section, were of a grayish-white color, and appeared to be composed of compact fibrous tissue, with the exception of one case in which they were less firm, and presented the appearances of the extravasated-blood patches already described. With the exception of petechiæ the small intestine was nearly always normal; in one case there were two or three patches of inflammation one to two inches in diameter. The rectum was congested or inflamed in spots only; there were occasionally the nodular masses mentioned above, but in a majority of cases this part of the intestine showed little or no change.

The stomach in one-third of the cases was unchanged; in the remainder there were patches of inflammation from the size of the palm of the hand to the involving of half of the surface of this organ. Sometimes this was confined to the mucous coat, but often implicated the whole thickness of the walls.

The cavity of the thorax in every case contained a considerable quantity of a turbid, bloody liquid, in some cases nearly black in color; the pleuræ were generally thickened and covered with false membranes; the lungs were constantly found inflamed, occasionally in a few small spots only, but generally the greater part of the lung tissue was involved. Often these organs were greatly congested throughout, and would break down under the slightest pressure. The bronchial tubes were also found congested or inflamed, and contained considerable frothy mucus, which in some cases entirely filled them. The pericardium was in nearly every case distended with a turbid, blood-colored liquid, but no false membranes were discovered, and only in one case a piece of coagulated lymph the size of a hen's egg was found floating in this liquid. The heart seemed to be congested throughout in most of the cases, and had patches of a deeper hue than the rest on its external surface. These patches were very suggestive of inflammation, but in the absence of coagulated lymph this may be considered doubtful. This organ at times contained clots of blood of different consistency, and always of dark color, and at other times all the cavities would be found empty. In all cases the blood was very dark, and generally formed an imperfect clot, and the lymphatic glands were enlarged and greatly con-

gested. The larynx and pharynx were found normal in all the *post-mortem* examinations, but in some of the living cases there was considerable swelling about the larynx and ulcers on the posterior part of the tongue. The liver was generally as in health, though in some cases it was congested, spotted, and softened, and once was found smaller and more dense than natural. The bile was at times very thick and dark, and again very thin and of a bright yellow color. The spleen was normal in two-thirds of the cases; in the remainder it was slightly enlarged and softened. In two cases the interior was almost of a fluid consistency, while in one the organ was smaller and firmer than in health. The bladder was generally normal, but in two or three cases was inflamed and covered with blood extravasations about the neck, and contained in these cases bloody or very turbid urine. The kidneys were seldom more than slightly hyperæmic, but in a few cases there was considerable extravasated blood in the tissues about the hilum, and on section the substance about the pelvis was found infiltrated with perfectly black blood.

We have here a considerable variety of pathological changes, the only constant ones being congestion and inflammation of the lungs, colon, and cæcum, and congestion of the lymphatic glands. To mention any single peculiarities of these lesions as characteristic of this disease would not be possible from this investigation. Neither the thickened fibrous patches, the ulcerations, gray elevations of the intestines, the cuticular eruption, nor petechiæ were constant.

NATURE OF THE DISEASE.

In studying the nature of an unclassified disease the first question that occurs to us is: Is the affection a general or a local one? In other words, does the disease originate from functional or organic disorder of any particular organ or apparatus, or are the anatomical lesions developed secondarily as the consequence of a general affection? And this question, as regards the disease under consideration, can now be answered in a definite and satisfactory manner. Indeed, when we consider that the first symptom, and one preceding all others by several days at least, is an increase of temperature; that when localized a great variety of organs belonging to different systems and apparatus are involved, as, for instance, the nervous system, as shown by occasional paralysis and apoplexy, the lungs, pleura, bronchial tubes, heart, liver, stomach, intestines, spleen, kidneys, bladder, and skin; that there are considerable changes in the blood, as shown by imperfect coagulation, solution of the coloring matter, and blood extravasations, there can scarcely remain a shadow of doubt that the trouble is not a local but a general one.

The next question in logical succession relates to the contagiousness of the disease. Is its extension due to a principle which is multiplied in the bodies of sick animals, and which is of itself sufficient to cause the disease in healthy ones? In answering this question I will merely mention the experiments of Professors Axe, Klein, and Osler, which prove that the disease may be inoculated without detailing their facts; and I will only allude in like manner to the instances already recorded by Dr. Sutton, Professor Axe, and others, which seem to prove its highly contagious character. Most of these facts have been published in recent reports of the Department of Agriculture, and there is no need of repeating them. In my own investigations I have met with facts which entirely confirm the opinion of these observers in regard to this latter point. Thus I have found the disease to start at some point and spread slowly in different directions—not rapidly, as though depending on atmospheric conditions—and the rapidity of this extension depends to a very great degree on whether these animals are allowed entire liberty

or whether they are kept on the premises of the owner. In Mecklenburg county no stock is allowed to run at large, and the disease existed during the present year, in some localities, from early in the summer, and up to October first by far the greater part of the country was free from it; while in Alamance county, where no restraint is put on the animals, the disease spread from one extremity of the county to the opposite in a few weeks. In each of these outbreaks, and, indeed, in every one I have observed, it is no difficult matter to find one locality where the hogs have nearly all died and the disease has finished its work some weeks or even months before, while in almost every direction, at a distance of five, ten, or fifteen miles, these animals are just taking the affection; that is, the disease has extended and is extending, and it has required this length of time to travel this short distance. Can it be possible that an atmospheric or climatic change would travel no faster than this? Again, if dependent on such conditions, why do we find one township devastated by it and another not many miles distant entirely free from it? Such instances are very apparent in Haywood, Mecklenburg, Lincoln, and Gaston counties at this writing, and were not less so in Buncombe county in 1877. If it is claimed that this depends on the condition of the soil, it is only necessary to reply that in the outbreak just mentioned, in Buncombe county, there are no facts to justify such a theory. In Swannanoa township, which is high, rolling land, with very few bottoms, no swamps or malaria, and which cannot be surpassed for healthfulness, the loss was 60 per cent. of the whole stock; while in Upper Hominy, which has no advantage over Swannanoa in healthful location, but which is more remote from thoroughfares traveled by western droves, the loss was only 2 per cent. It was probably entirely free from this disease.

A large number of instances could be produced of outbreaks in this State, particularly in the western part of it, clearly traceable to infected droves, and this is, above all, the case with the first introduction of the disease. It is difficult to establish exact dates, but all accurate testimony points to 1859 as the first appearance of this trouble. Some think the earliest outbreaks might have been a few years before that date, but of this I have been able to get no evidence. Mr. Morris, of Polk county, remembers that a drove stopped at his place in 1859; that some of the hogs died there of the disease, and that soon afterward this malady spread among most of the hogs in that locality. This was the first appearance of the trouble in that county. Mrs. Davidson, of Buncombe county, remembers that during the life of her father, who was a large hog-raiser, and who lived on the route followed by the droves, no hogs were lost by this disease, but that about the time of his death (1858) droves came through with sick animals, and that this was the first appearance of the disease in that locality. Many other people who cannot remember dates are positive in the opinion that the disease was introduced by droves from Tennessee and Kentucky. One man remembers that he was employed by the drovers to kill the animals that were sick and cure the meat. He also remembers that these animals had diseased lungs, and such a bad odor that they could scarcely be dressed. This was his first experience with the disease known as "hog-cholera." Colonel Polk, our present commissioner of agriculture, informs me that the first appearance of this disease in Anson county was in 1859; that it was undoubtedly brought there by western droves, and that these animals died to such an extent that the drovers took them secretly to the woods and buried them under brush and rails to conceal them. A drover who sold his hogs in Georgia at that time informed me that the disease was first introduced in that State in 1859, and that he had no doubt it

was carried there by the droves. Indeed, I have found but one opinion among those best informed on this matter, and that is, that the disease was never known in this section till introduced by animals driven from Western States; and in some sections of this State, a part of Alabama county for instance, the disease never existed till the present year.

Judging from all these facts, therefore, we cannot escape the conclusion that this disease is a contagious fever.

In this connection there is one more question that is generally raised by those discussing the nature of this fever, and that is, does the disease always originate from pre-existing contagious germs, or is it often or generally developed *de novo* as a result of improper hygienic surroundings? In the consideration of this question I shall confine myself to the facts brought out by the investigation in this State, simply premising that most of these facts are as true of the Middle States and probably of most of the Southern States as of North Carolina. The first point that attracts attention is the fact that this State was free from the disease till about 1859, certainly till it was introduced by droves from other States, whatever the date may be; hogs had been kept in this State from the time of its first settlement undoubtedly under similar hygienic conditions, and yet the disease had not appeared up to that time, when it was brought by imported animals, just as England was free from contagious pleuro-pneumonia up to 1842, when it was imported with animals from the Continent. It is claimed that in the west the disease is produced by overcrowding and filth, but I doubt if these animals are crowded any more now than forty years ago; indeed, I was surprised at the results of my investigations on this point, for, in all the time I have been visiting infected localities, I have not found a case of overcrowding, and not more than two or three where there was anything like filthy surroundings. In the western part of the State most of the hogs are kept in the large mountain forests, or are at least allowed the run of the highways and commons; in the east they either run in the highways and old fields or have ample pastures. If it originates from restricted range and unhealthful climatic conditions, it is certainly in the east that we should expect to hear of its originating and proving most disastrous; but it was known in the mountains as early as in the other parts of the State. And if we examine the list of counties which I have given above, we shall find it as fatal in the elevated and healthful west, with its immense mountain ranges, as in the malarious east. I append some conspicuous examples of this:

Loss in eastern counties.		Loss in western counties.	
	Per cent.		Per cent.
Camden	35	McDowell	37
Lenoir	24	Buncombe	25½
Robeson	14	Mitchell	15½
Hyde	10½	Cherokee	10½

We find here, then, just as large losses in the west as in the east, and just as small ones in the east as in the west; in other words, the disease rages irrespective of these climatic and hygienic extremes; and this becomes still plainer when we add that in Swannanoa township of Buncombe county the loss reached 60 per cent.

Of course, at the present time, as with all contagious diseases which have existed for several years in a country, there are some outbreaks which it is impossible to trace to their source; and it seems probable that the contagion may be preserved over winter in manure, straw, litter, or in the remains of unburied animals which died the preceding year. There are some outbreaks that cannot well be explained otherwise, and, indeed, there is no reason to doubt that this may be the case; contagious

germs may also undoubtedly be carried a considerable distance by other animals or birds, and it is for this reason that many farmers have concluded that pasturing hogs on wheat-fields produces the disease; but hogs were pastured on wheat-fields as well thirty years ago as now; why did not the same result follow then?

I have concluded, therefore, after a careful study of these facts, that this contagious disease does not originate *de novo* in North Carolina; and that if the contagious germs now in the State can be destroyed and their importation prevented, we shall be as free from it in the future as we were before its first importation, about the year 1859.

HYGIENIC AND MEDICAL TREATMENT AS PREVENTIVES.

It was one object of this investigation to determine if the best hygienic conditions, clover pasture, large range, and variety of food have any preservative influence against this contagion; and while a large number of cases where these conditions seemed perfect could not be collected, the few that were observed prove that these alone are absolutely powerless to keep off the disease. Thus, Mr. Wadsworth, of Charlotte, lost 117 animals, nearly his whole stock, which had the run of a clover pasture and large wood lot, which had in addition slops from the city hotels, and grain. In this case disinfectants were freely used. Mr. Davidson, of Hopewell, lost 50 per cent. of his herd under similar conditions. A herd kept at a slaughter-house, in Charlotte, which had other food as well as the refuse, was the first to take the disease, and suffered to the same extent as others. Indeed I met with hundreds of cases where animals had large pastures and other food in addition daily, where such popular preventives as salt and ashes, sulphur, tar, oil of turpentine, charcoal, and copperas were freely and regularly given, where the majority of the animals were neither too fat to be vigorous nor so poor as to be wanting in this respect, and yet from 50 to 90 per cent. succumbed to this affection. In one case where I had the tincture of chloride of iron given regularly as a preventive, commencing before any of the animals showed even an elevation of temperature, and where they were in a large pasture at a considerable distance from any others, the disease has appeared; two have died and others will probably follow.

Some experiments were made with bisulphite of soda, salicylic acid, bichromate of potassa, and bromide of ammonia to determine if these have any power to arrest the disease when given before any symptom but increased temperature had appeared; the results of these were as follows:

. Agents.	Number of animals.	Beginning of temperature.	Dose per day.	Length of experiment.	Final temperature.
<i>Bisulphite of soda.</i>					
Experiment No. 1.....	6	103.6° to 106° F.	4 drachms.....	7	96° to 99° F.
Experiment No. 2.....	4	103½° to 107° F.	1 ounce.....	4	102½° to 105° F.
Experiment No. 3.....	3	103° to 104° F.	1 to ½ ounce.....	7	103° to 106° F.
<i>Salicylic acid.</i>					
Experiment No. 1.....	4	104½° to 107° F.	30 grains.....	7	100° to 101° F.
Experiment No. 2.....	8	103° to 106° F.	45 grains.....	6	103° to 105° F.
<i>Bichromate of potassa.</i>					
Experiment No. 1.....	3	103½° to 107° F.	½ grain.....	7	103° to 105° F.
<i>Bromide of ammonia.</i>					
Experiment No. 1.....	4	103° to 106° F.	23 grains.....	7	103° to 106° F.

These experiments show that none of these agents can be depended on to stop the changes going on in the blood as a consequence of this disease. Although both bisulphite of soda and salicylic acid in one experiment each appeared to accomplish this, they failed in other cases where given in larger doses for an equal length of time; and when we consider that in no contagious fever has a remedy been discovered capable of arresting the course of the malady, the doubt in regard to the efficacy of these agents in this disease must increase.

SANITARY REGULATIONS.

We are finally brought to the irresistible conclusion that sanitary regulations properly framed and enforced are the only means at our command for checking the ravages of this disease and relieving our farmers from the enormous losses at present occasioned by it. We cannot expect, however, that this desirable object will be accomplished without considerable expense, especially in the first years of the attempt. We must expect outbreaks in all parts of the country where the disease has previously existed, caused by contagious germs which have been preserved in some of the ways already mentioned; but we should be encouraged by the fact that in most parts of the country, at least, these germs, unless especially preserved in straw, manure, remains of dead animals, &c., are entirely destroyed during winter. Thus, in Swannanoa township, where 60 per cent. of the hogs died in 1877, there has been no outbreak up to October 30, 1878. Above all must we realize the necessity of thoroughly destroying every particle of contagion wherever it appears. Although this would undoubtedly be very expensive, it would certainly be a great saving, even at the start, on the great losses which we are now annually experiencing; and if the work is thoroughly done we may expect that this expense will be reduced to a comparatively small item in the course of a few years. At the worst such expense would be much less than the use of a specific by individual farmers, even if such a remedy were discovered. In regard to such regulations I would suggest the following points as necessary according to what is now known of the disease:

1. The regulations should go into effect in winter or early spring when fewest animals are affected, or when, as my experience indicates, the disease is entirely extinct.

2. People living in localities where the disease has prevailed within two years should keep their hogs in an inclosure free from accumulations of manure, straw, litter of any kind, or remains of dead animals in which the contagion might possibly be preserved, and in which there were no sick hogs the preceding year.

3. That in such localities, *i. e.*, where the disease has existed within two years, it should be made obligatory for persons owning hogs to report each and every death occurring in their herds promptly (within forty-eight hours if but one, or twenty-four hours if more than one, or if others are sick), to a designated person to be located in every township or county, unless such deaths were plainly caused by mechanical injuries, drowning, maternity, &c. And that there should be districts established of convenient size, in each of which a competent veterinarian (or physician in case the veterinarian could not be obtained), should be appointed, to whom the above township or county officer should report whenever two or more such deaths have occurred in the same herd within a fortnight; whenever an unusual number of deaths have occurred in any locality, or whenever there is any reason to suspect the presence of this disease.

4. On receipt of such report the veterinarian should visit the locality and make a careful investigation into the nature of the disease, using the clinical thermometer and making *post-mortem* examinations.

5. If the contagious fever is indicated the whole herd should be slaughtered, the animals deeply buried, the place thoroughly disinfected, and no more hogs allowed there till after a succeeding winter.

6. When the disease exists to any considerable extent in a locality, those owning hogs in adjoining townships or even counties, according to the extent of the outbreak, should be required to keep them in small inclosures or pens, at a distance from roads or streams of water coming from infected localities. This is necessary to lessen the danger of infection and to allow more thorough disinfection in case the disease appears.

7. A certain compensation should be allowed for slaughtered animals—say 25 per cent. on a fair valuation for those plainly sick, 50 per cent. for those which simply show a rise of temperature above $103\frac{1}{2}^{\circ}$ F., and full value for the healthy ones.

8. In case a hog-owner fails to comply with above regulations a penalty might be fixed, or at least such a person should receive no compensation for slaughtered animals.

These are the regulations that seem to me most necessary, but there may undoubtedly be circumstances in which these may be advantageously modified. Thus in case of a herd of several hundred animals, in which but few are affected and the remainder show a healthy temperature, it might be advisable to simply kill and bury the *affected* ones, to thoroughly disinfect the premises and to kill others as soon as a high temperature becomes apparent. Or in case all were killed the meat of the healthy ones might be preserved and marketed. It is also possible that, through negligence in making reports or an improper diagnosis of the disease, such a large territory may become infected as to make it advisable to establish a sanitary cordon, isolating the locality as much as possible; and leave the disease to run its natural course. In such cases no live hogs should be allowed to leave the infected section till after a succeeding winter, nor any carcasses of hogs till after freezing weather; people living within this district should be prohibited from going near swine outside of it, nor should drovers or others from outside be allowed to visit the infected swine. All dead animals should be promptly and deeply buried, and disinfectants freely used. All hogs in such district, and for twenty miles distance from it in all directions, should be kept in small inclosures at a distance from roads, in order to lessen the chances of extension and to allow thorough disinfection.

If such regulations are thoroughly carried out there can be no doubt that the ravages of the disease will be greatly diminished at once, and in a few years many States which now suffer terribly from it will be completely exempt; while in those where it now proves most disastrous there is reason to believe it would never cause serious losses. Sanitary regulations similar to these are the only means that have ever been successful in combating the contagious diseases of animals, and while we would not be understood as discouraging the search for specific remedies we cannot disguise our opinion that it is extremely irrational and absurd to delay action in this disease till such specific shall have been discovered; in other words to neglect those measures which have alone succeeded and cling to those which have always failed.

Respectfully submitted.

D. E. SALMON, V. S.

SWANNANOA, N. C., November 15, 1878.

REPORT OF DR. ALBERT DUNLAP.

Hon. WM. G. LE DUC,
Commissioner of Agriculture:

SIR: On the last day of July, 1878, I received from you a "commission to act for the Department of Agriculture in the examination of diseased animals," accompanied with printed instructions directing me to particularly examine into causes of the disease known as "hog cholera." I interpreted my instructions as follows: Find out what disease or diseases are destroying the swine and the symptoms of the same; the causes, both predisposing and exciting; the stage of incubation, morbid anatomy, &c., and to discover how far attention to hygienic care will prevent the spread of the disease in infected herds and its inception in healthy droves; and in addition to test the value of various medicinal remedies for curing the sick and preventing the spread of the disease. Recognizing the primal fact that the hog is an animal of short life, low vitality, and of comparatively little pecuniary value, singly, as compared with other domestic animals, and that they are kept in large droves by most Western farmers, I considered it of little profit to attempt to meet each special symptom with its appropriate remedy; but rather, after having fully diagnosed the disease or diseases, their nature, causes and lesions, and the predisposing causes which had assisted in the spread of the same, to try and devise a system of treatment, both hygienic and medicinal, which could be used in the treatment of large droves already infected, and reduce the liability of healthy droves contracting the disease. I do not claim for this report any degree of perfection. The limited time allowed only permitted the examination of the disease under certain climatic influences, and not through the various seasons of the year. I am, therefore, only able to report on the diseases which came directly under my own observation in this State (Iowa) during the two months of investigation, briefly referring to cases of diphtheria which I carefully observed last winter, and of which I have seen no cases during this investigation.

The medical literature upon the subject of the diseases of swine was very limited, and I could find no strictly scientific work treating upon the topic. I was, therefore, forced to fall back upon my knowledge of the diseases of man as a foundation, and after having fully examined the symptoms and morbid lesions in a series of cases selected out of an infected drove, I compared those symptoms and lesions with like symptoms and lesions found in man, and thus arrived, I think, at correct conclusions as to the proper name of the diseases under consideration. I was thus materially assisted in tracing out both the predisposing and exciting causes of these ailments. To the casual observer it may seem absurd to form conclusions in regard to diseases of swine from a previous knowledge of the diseases of man, but when we consider that the hog resembles his two-footed brother in many respects, has a similar alimentary canal, like viscera, the same system of blood-vessels and nervous structure, is also omnivorous, and that the diseases under consideration are caused by specific blood poisons, which act in like manner on man and brute through the process of inflammation, we can but conclude that if we find a set of certain classified symptoms in a hog with a distinctly marked uniform set of pathological lesions, and a similar set of symptoms in man with like morbid lesions, that these two are one and the same disease, and should bear the same title, especially when we can trace the cause in both cases to the same exciting agent. I have been forced

to depend entirely upon my own observations for the material of this essay, and I will say in defense of the position or theories I advance, that they are my conclusions after inspecting over three hundred herds of diseased swine in various counties of this State, and after a careful dissection of nearly one hundred diseased animals. In justice to the farmers of Iowa, it is my duty to state that I received much valuable assistance from their hands. During the progress of my investigations prominent symptoms were pointed out by farmers who had made the disease a study, and I am only sorry that I cannot give each one credit for his particular contribution. I made my "headquarters in the field," and strived to obtain a thorough knowledge of the subject in all its details. I was forced to abandon the use of the microscope after a few days' trial.

HOG-CHOLERA.

Definition.—Any contagious or infectious disease attacking swine with usually fatal results. This definition will include all fatal diseases that are contracted by one hog from another, either by direct contact or by contact with the discharges or exhalation of any diseased animal, or the gases arising from any contaminated matter. Under this head can be properly included the three diseases I have discovered during my investigation, viz., *diphtheria*, *typhus*, and *typhoid fever*. The definition will exclude worms, lung-fever, pneumonia, pleurisy, or any special inflammation of internal viscera which are the results of climatic influences, vicissitudes of weather, or improper food. I am led thus accurately to define the disease and draw the line of distinction, because I have repeatedly found droves of swine suffering with so-called hog-cholera, when, in reality, there was no contagious disease whatever prevailing, but they were sick and dying because the rules of common sense had not been observed in their care. Because a number of hogs in a drove are taken sick at one time and with like symptoms, it does not follow that they are suffering from any contagious disease, and the sooner the fact is impressed upon the farmers the better it will be for their pockets. Often it is not medicine that is needed but a change of food. I will give a few cases which will best illustrate the ideas I wish to convey. Mr. B. kept his swine in a lot of one acre, more or less, where they had but little exercise, regular food, and sheltered bed. After gathering his corn he turned his entire drove into the field to glean. They also had the range of a forty-acre wood lot. Two days after he found a number of his shoats sick, five of which soon died. The disease was pneumonia or lung-fever. Morbid anatomy in each case showed at least one lung hepatized and inflammation of pleura.

Cause.—The hogs were previously confined without exercise and had regular food and sheltered bed. They were then turned out in large range, exercised fully (especially the shoats), slept on bare ground at a time when the weather changed suddenly colder, and the result was lung-fever and death. No medication was needed to prevent the healthy shoats contracting the disease, and a little care and simple medication would have probably cured the sick.

Mr. M. kept his hogs on a clover and grass range. They had stagnant water for drinking, and sour, fermented swill was fed freely twice a day. The land was flat river bottom, with black soil; ringers were used to prevent rooting; no roots, vegetables, or corn were given. The natural result of such errors in diet was sickness, emaciation, and death. First, the young pigs pined away; sudamina appeared upon the eyelids, nose, and ears, and one animal after another was attacked with convulsions and died. The brood sows and stock hogs soon followed in

the same way, and when I visited the farm fifty out of eighty head had been cut off in this useless and unprofitable way. Three sick hogs were killed and dissected. The lungs were white, but showed no signs of organic disease. The kidneys were light colored and showed some irritation in tubules; all internal viscera without organic disease. There was a lack of red corpuscles in muscular tissue, which appeared almost white. The disease, in this case, was simply starvation. As yet no contagious disease has appeared in the herd, but the hogs were in such a condition that if exposed to the slightest miasma they would inevitably contract any contagious disease, and, with the debilitated blood to begin with, would rapidly succumb to it. Now, I assert that although the drove was supplied with abundance of food in kind, yet it was not the nourishment demanded. There was an excess of certain constituents and absence of others necessary to health. Every article of food furnished this drove contained acid. This was the case with the clover, grass, and slops given them. The water was poisonous also, and they were deprived of the alkaline salts necessary to life. The small quantity they might have obtained from the ground was made inaccessible by the rings in their noses.

In this drove the tongues of the hogs were large, white, and flabby, indicating plainly the need of change of diet. There are many other errors in diet which will be alluded to when we come to speak of the predisposing causes—errors which do not cause death, but which render the hog peculiarly liable to contract contagious diseases, and also increase the expense of feeding.

I will now give an illustration of a case where too much care, misdirected, caused disease and death: Mr. C. builds a so-called model pigpen. It is low and tight; the sun and air are excluded; the floor is of boards, and is raised above the ground. To prevent dampness, straw is furnished liberally to keep the hogs warm. The feed-lot is exposed to the north and west winds. The hogs, sleeping in this damp place, with cold boards under them, pack closely together in the damp straw, for, no matter how dry the straw may be when put in, in the course of a few hours it will be wet and loaded with ammonia. Mark the results. At reveille they come from their sheltered house wet and heated, pass into the feed-lot exposed to the bleak north wind or cold rain from the west, and the natural consequence is coughs, colds, bronchitis, pleurisy, lung-fever, inflammation or irritation of some internal viscera from the sudden check given to perspiration, or sudden change of temperature by the inhaled atmosphere. If the exposure is not sufficient to cause a fatal inflammation, it will cause a bronchial irritation, as shown by cough. The system is vitiated, and any contagious disease prevailing in the vicinity is liable to attack the drove. The owner reports the cough as existing for one or two months as the first symptoms. In this case the cough was caused by errors in care, and was but a symptom telling the farmer that his swine had contracted a cold, and that this disorder of the system would debilitate and render them more liable to contract any contagious disease to which they were exposed.

We will now take up in their order the three diseases which come properly under the title of "hog-cholera," that is the diseases which answer to the definition we have given of hog-cholera. We do not claim that these are the only contagious diseases which are known to cause death. There may have been others in past years, or even in this year, but they did not come under my observation, and having accurate reports from many prominent and intelligent stockmen in all the Western States, detailing the symptoms in their infected hogs, I can but con-

clude that these three diseases are the only contagious diseases which have attacked hogs in the last two years. After describing each disease, its symptoms, course, stage of incubation, pathological lesions, causes of death, and exciting causes, we shall take up the subject of predisposing causes toward the contraction of these diseases. Then we shall point out the best plan of treatment, both hygienic and medical, for curing the sick and preventing the spread of any contagious disease among healthy animals.

TYPHUS FEVER.

Definition.—A specific continued fever, attended with increased temperature, usually above 105° F.; stupor; congestion of brain; swelling of forehead; stiffness of joints; excessive soreness of all tissues; a profuse eruption on the belly and inside of thighs, with costive bowels during the first few days, and usually terminating in death within fourteen days.

Symptoms.—Headache, as shown by wrinkled forehead; partially shut eyes; nose held near the ground; loss of appetite; stupor; indisposition to move; excessive soreness of all tissues, the slightest pressure causing excessive pain; swelling of forehead between the eyes; tongue generally large, white, and flabby, especially if the disease is complicated with malarial poisoning. There is also great restlessness, shortness of breath, and cough. The sick hogs are frequently lame in one limb, and cannot even put it to the ground. The heat of the body is excessive, the temperature rarely ranging below 105° F., and generally reaching as high as 108° to 109° F.; and if the hog is not carried off from the fifth to the seventh day a copious eruption appears on the bowels and on the inside of the thighs and other soft parts. The bowels are almost always costive during the first week and the discharges hard and dark colored. Thirst is excessive, and the hog will often drink until it falls over dead. During the second week we have increase in the severity of symptoms. Sordes collect in mouth; small watery pimples appear on nose, eyelids, and ears; there is great prostration of strength, with staggering gait when forced to walk. Costiveness may now give place to diarrhea; urine is passed while lying down, and convulsions or fatal stupor intervenes; enlargement of glandular structure, especially in the neck, is a common symptom, but in no case have I found abscess with healthy pus, but rather thin sanious fluid. A common symptom during the second week is thumps, and I have never known a case to recover when this symptom was present. The thumps appear to be nothing more than a spasmodic action of the nerves, like hiccough in man, and denotes great prostration and approaching death. In advanced stages of the fever these are the main symptoms, and this alone is a common course of the disease, as I have observed it. But there are many exceptional cases. Many hogs, especially those debilitated by errors in food or from the effects of malaria, will succumb to the influence of accumulated poison acting on the brain and nervous system, and die within twenty-four hours. This is of frequent occurrence, especially in young pigs and shoats. Others will die from obstinate constipation, the impacted feces causing ulceration and rupture of descending colon and rectum. In some herds convulsions, from congestion of the brain, occur during the first day, and unless relieved the case terminates in death in a few hours. Tubercular deposit in the lungs and in the mesenteric glands is very common. In this disease, as also in typhoid fever, the smouldering spark of scrofula is fanned into a flame by the fever, and the tubercular matter is deposited in the lungs and glands, and the patient

that might have recovered from the fever is carried off with consumption. The odors of the exhalations are peculiar, and will at once diagnose the disease from any other. To describe this peculiar smell would be impossible in words.

Duration.—The duration of the disease is variable. Many animals die within a few hours, but if the bowels are emptied by saline cathartics or injections, the animal generally lingers into the second or third week before the crisis will occur. The prognosis is very unfavorable, especially in large droves, where little can be done to relieve symptoms. Our advice is, in all large herds where this disease obtains access, to destroy at once the sick animals, burn or bury the carcasses of the dead, and labor to check the progress of the disease by prompt hygienic measures. In small droves, or where the stock is of peculiar value, an effort may be made by the use of medicinal agents and care to relieve the symptoms and guide the case to health. But in large herds this effort will be found unprofitable. When we remember that in man, with all the advantages of a thorough knowledge of the disease, with skilled physicians and competent nurses to care for the sick, many of those attacked in crowded armies succumb to the influence of the disease, we certainly cannot advise farmers having large herds to attempt remedial measures. Another argument against attempting to cure those having well-marked symptoms of the disease is that, if there is the slightest taint of the scrofulous diathesis in the blood, the spark will almost certainly be fanned into a flame, and the patient, reacting from the specific fever, will be carried off by deposit of tubercular matter in the lungs or mesenteric glands. Now, we know that the hog is an animal of low vitality, and, in a majority of cases, of scrofulous habits, hence we need not be surprised to find consumption a very frequent sequence in this disease.

Pathological lesions.—During the first three days after the appearance of the outward symptoms of the disease dissection will show but little, if any, change in the viscera. The bowels will be found loaded with hard fecal matter, and careful examination will disclose some thickness of the inner coat of cæcum and ascending colon. A hog which has been sick a week or ten days will still disclose no disorganization of internal organs sufficient to account for the severe outward symptoms. The blood is blacker and less coagulable than in health; a general irritated condition of all mucous membranes will be noticed. The lungs will show no organic change, unless tubercular matter has already been deposited. In a majority of cases dissected, I have found the liver, kidneys, and spleen healthy—at least showing no signs of disorganization. I have never, in this disease, found abscess of any internal viscera, but have frequently found a low form of inflammation in the glands of the neck, which discharged a thin, sanious matter, but not true pus. In all cases examined I have found certain uniform morbid lesions, invariable thickening, and deposit in certain portions of alimentary canal, particularly at opening of small bowels into large bowel. This increase of tissue may take place in stomach or in any portion of alimentary canal, but will always be found in the cæcum around the ilio-cæcal valve. In a large number of cases I have found at this point that "peculiar bearded appearance" spoken of by Flint. But these black specks were only found during the first few days of the disease. At a later stage there was invariably great increase of tissue, thickening, and hard deposit. During the investigation I dissected over fifty hogs, all presenting the peculiar symptoms of typhus fever, and in every case I found thickening or deposit around the ilio-cæcal valve; in several cases where the disease was recent I found the minute black specks, and my own opinion

is that the bearded appearance or black specks are the commencing lesions of the disease, and that this is followed by thickening or deposit. Anomalous lesions were found in many cases. In one the entire mass of bowels were found agglutinated. In several others were found enormous thickening or deposit in coat of stomach; but in all cases, as before mentioned, there was one lesion always present, a deposit or thickening around the ilio-cæcal valve where the solitary glands of cæcum are situated.

The cause.—The exciting cause of this disease is a specific poison in the blood, an infectious, miasmatic poison, and the disease cannot be generated by any excess of filth, by want of care, or any errors in food. The specific poison must be there. The hog, to contract the disease, must be exposed to the specific miasma arising from another animal suffering from the disease. This disease is very contagious, and if it once obtains access to a drove of swine, prompt measures only can prevent its spread to the entire lot. The rapidity of its spread depends upon the condition of the drove and the ventilation. When the hogs are allowed an extensive range, and are not crowded together, it will spread slowly; but where they are cooped up in a contracted pen it will spread very rapidly. Although, as I have before said, this is the most contagious and fatal of any disease that has attacked swine, yet it has one redeeming feature, it is more easy to prevent its access to a drove, as the miasm cannot be carried as long distances by wind and other methods of conveyance as can the poisons of diphtheria and typhoid fever.

It may be well for me to explain the statement that filth cannot generate the disease. No amount of filth, no confinement in close quarters, no errors in food can produce the disease, but filth, want of ventilation, and improper food can deprave the system, disorder the stomach and render the animal more liable to the inception of the malady. Hence the disease often obtains access to a drove by means of one or two animals whose systems are disordered, and having once obtained a foothold spreads to the healthy ones, the contagious influence being now nearer and stronger.

Incubation.—From the few cases where the stage of incubation could be accurately determined, that is, the period of time elapsing from the time of exposure until the outward manifestations of the disease, I would place the period of incubation at fourteen days. I have but two instances to report where the time of exposure could be exactly determined. To verify this statement, in each of these cases the exact time of exposure (by arrival of strange hogs suffering from the disease,) and the first outward symptoms of the disease were noted, and in each case it was fourteen days from time of exposure until the symptoms of disease appeared. [See notes on Homestead (Amana Society) Colony.] We shall speak of the predisposing causes when we come to consider the three diseases collectively, as the same causes will promote the spread of either one of them, but in different ratio.

Typhoid fever—Definition.—A specific continued fever, attended with great prostration of strength, stupor, tympanites, diarrhea, showing specific anatomical lesions, namely, ulceration of the solitary glands of cæcum and colon. The disease, when uncomplicated, runs its course in nine days. During the first month of my investigation I made no separate classification of those two diseases—typhus and typhoid fever. My course was as follows: From each infected drove inspected, I selected from two to five diseased hogs of various ages and at different stages of the disease. After carefully noting the age, history, and morbid symptoms in each case, the animal was killed, and exact notes taken of the

condition of the blood, and also of each of the internal organs. From the start I noticed that the symptoms varied greatly in different droves, particularly in condition of bowels, the amount of eruption on skin and the duration of the disease and its fatality. I also noticed the morbid lesions varied greatly in different droves. On my return to my office, after three weeks' inspection, I made a careful review of my notes taken in the field, and found I could separate the symptoms into two distinct classes, only resembling each other in the one peculiarity of being low or typhoid in their character. I also found that the pathological lesions could be separated into two distinct classes, and that each of the two classes of symptoms were accompanied with one of the two classes of lesions. I was also impressed with the results obtained from treatment by those whose swine presented the peculiar symptoms and lesions which I now call typhoid fever, who reported that the disease had been promptly checked in their droves and a large part of the sick hogs cured by following my instructions in regard to hygienic care and medical treatment. Those whose hogs presented the typhus symptoms and lesions almost invariably reported that all the sick had died, and in most cases the disease was still continuing its ravages. I had also noticed that the peculiar odor spoken of was present in some droves and absent in others, and on examining my notes found that this odor was confined to the typhus cases. There was, of course, more or less smell wherever there was any disease among the swine, but the odor in the typhus form had a certain difference that could be noticed by any one. Thus finding I had two distinct diseases to deal with, the one resembling very nearly typhoid in man, the other presenting symptoms and lesions with which I was not particularly familiar, I turned to my medical library for information, and found a disease described as occurring in man, with symptoms and lesions exactly resembling those I had classified in swine. I, therefore, called this second disease typhus fever. I placed typhus first in my list, because I found it the most frequent and most fatal of the three, and the one which has caused the greatest pecuniary loss to the farmers.

Typhoid fever symptoms.—Loss of appetite; headache; avoidance of light; standing with its head in a fence corner, or lying in such a position as to keep the light from its face; will only move when urged, and then but a short distance to resume its former attitude; a hot, dry skin; high fever; thermometer often showing 105° to 109° F.; increased urine; diarrhea; tympanitis; cough; shortness of breath, or quick breathing; stiffness of hind quarters. The hog moves his back from side to side as he moves his hind legs. Bleeding at the nose is a common symptom. These symptoms continue with remarkable uniformity during the nine days. There is an entire loathing of food, and as the disease progresses great weakness is manifest. The hog cannot be forced up, but lies for hours in a semi-stupid condition, but still restless and showing signs of nervous excitement. If the case is of a severe type the symptoms will be aggravated. The bowels will be enormously distended; urine scanty and high colored; fecal matter will be passed while lying down, and the urine will pass every time the hog is moved; more or less petechiæ will be found on the abdomen, but in limited numbers. The first sign of improvement is inclination for food and disposition to move around, and in this disease this is the most critical period. Improper or overabundance of food is liable to cause rupture of bowels and death, and it is at this time that many swine which have passed through the disease to the crisis are killed by incautious feeding. The nose bleeding is seldom severe, but hardly ever absent. The cough is of no importance as

a symptom, as it is present in all inflammatory diseases depending upon a specific blood poison. Many farmers point to a cough lasting from one to three months as a preceding symptom of the disease, but this is a mistake, as the cough is due to the climatic changes or sudden exposure as set forth in another part of my report, and has no connection with the specific fever. This preceding cough should have told the farmer that there was some error in his management, which, unless corrected, would render his drove more liable to contract any infectious disease if exposed to its influence. The tympanitis is a prominent symptom in this disease, and if the hog is lying down a gentle tap on its distended flanks will show the presence of wind. Thumps or hiccough occurring during the second week is a fatal symptom. During convalescence small abscesses or boils often appear, and also sloughing of ears; in many cases the entire ears rot off. This condition is due to depraved blood, and demands tonics. Tubercular disease in lungs often makes its appearance during convalescence, and the hog is carried off by what is known as galloping consumption. Malarial complications often render the dangers of the disease more difficult, and have a material influence upon the rate of mortality. In most cases the malarial debility or fever is the primary disease, and the typhoid fever the secondary. The causes which lead to this fever we shall speak of under the head of predisposing causes of the specific fever. Enlargement of the glands of the neck does not often occur in typhoid fever. The duration of the disease may be set down at from nine to fourteen days when uncomplicated. I have no data from which I can give any information on the period of incubation.

Morbid anatomy.—I can best illustrate the lesions by quoting a few cases from my field-notes: Visited the farm of G. W. Davis, near Frank Pierce post-office, Johnson county, Iowa; breed of hogs, Poland-China; range, rolling prairie with clay subsoil; about ten acres in lot; lot covered with grass and brush; hogs also had a run of rye stubble; water running through lot; feed, raw sound corn and sour slop regularly. There was no disease in vicinity, and could trace cause to no contagious influence; disease had appeared two weeks previously, and nine head had died, three large animals and six shoats. There were twelve animals sick, five large brood-sows and seven shoats. This man complained, like many others, of losing his pigs. Symptoms, loss of appetite, high fever, diarrhea, emaciation, general stupor.

Dissection, No. 1.—Shoat three months old, sick one day; lungs white and showing no organic disease; some inflammation of stomach; liver and bowels appeared healthy. Thermometer showed 106° F.

No. 2.—Shoat two months old, sick one week; heat 107° F.; hepatization of one lung; liver, spleen, and kidneys appeared normal; some inflammation of inner coat of stomach. On opening the caecum there were found deep ulcers scattered around the ilio-caecal valve. These ulcers had only the peritoneal coat for a floor, and were in position of solitary glands.

No. 3.—Age two months, sick twelve days; thermometer showed 102° F.; lungs, liver, spleen, and kidneys showed no organic disease; lungs lighter colored than normal; considerable enlargement and inflammation of mesenteric glands; ulceration of solitary glands, but ulcers small and evidently healing.

Here we have an illustration of the disease in three different stages. In the first case ulceration had not yet commenced in the bowels. In the second it had eaten through all the coats of the bowels except the peritoneal. In the third case the ulcers were healing, and in a few days

the pig would have been well again. In some cases I have found small abscesses of solitary glands, each one discharging matter on pressure, and I think this will usually be found the primary stage of the ulcer. Whatever other morbid lesions may be found, the farmer should carefully inspect the inner coat of the bowels and determine the nature of the lesions of the ilio-cæcal valve in order that he may accurately diagnose the disease. I would impress this particularly, because in several instances I opened swine and found no morbid appearances whatever to account for the severe symptoms until the bowels were examined and the inner coat exposed. In one case a farmer in Hamilton county, who had made a specialty of doctoring hog cholera, after making what he called a thorough examination, declared that a diseased hog was healthy, but I opened the bowels and showed the signs of specific disease on the inner coat. Although we find the lesions in both typhus and typhoid fever at this point, we can only look upon it as an effect of a certain poison in the blood, but why it uniformly develops morbid lesions at this one point has not yet been determined, even in man.

Diphtheria.—A specific septic blood-poison, contagious in its character, with inflammation of mucous membrane of pharynx (throat), and exudation of lymph; inflammation and abscess of kidneys; constipation and fever. Symptoms: Loss of appetite; fever; swelling of glands of neck; discharge of blood and matter from nose and mouth; weakness; the bowels are casually constipated; the urine is at first increased in quantity, but afterwards decreases in amount. The hog may try to eat, but there seems to be a difficulty in swallowing the food. As the disease advances all the symptoms are aggravated. The hog becomes stupid, and only moves when forced to do so. The glands of the neck are enormously enlarged, the urine diminished, and is at last entirely suppressed. The animal strains to evacuate its bowels every time it gets up, but passes only a few hard lumps, and, unless relieved, it dies within from two to five days from suffocation, caused by swelling of the throat or accumulated poison in the blood acting on the brain. The primary disease may be either constitutional or local, but in either case both general and local effects are soon manifest. This disease is a contagious blood-poison received into the blood, and passing through the stage of incubation, manifests its presence first when the system strives to rid itself of the poison through the four great waste-gates of the body—the lungs, kidneys, bowels, and skin. The expired air, loaded with the poisonous excretion, passes from the lungs, and as it obtains exit from the wind-pipe, is thrown with force against the posterior fauces. There the poison is deposited, and diphtheritic inflammation and exudation is the result. The kidneys, also, strive to eject the foreign matter and are at first stimulated to increased work; hence the increased flow of urine; but as the labor increases the kidneys become irritated from overwork, then inflamed, and the septic poison, instead of being eliminated, is deposited in the kidneys, and abscess in the same is the result. If the free egress of air from the lungs is prevented, either by swelling of glands externally, or swelling and exudation internally, either in fauces or wind-pipe, the poison cannot be thrown off as freely as it passes into the lungs, and abscess of the lungs is the result. In fact, wherever this poison is deposited an abscess at once forms. The skin is hot and dry, and there is often an eruption or rash apparent on the surface. Abscess of the liver is also a common sequence of this disease if it has continued for any length of time. The bowels are invariably costive, and, unless relieved by injection or brisk cathartics, the hog will die, either in convulsions or coma, from the united depressing influence of the septic and uræmic poisons

acting on the brain, as the costive bowels causes increased labor for the kidneys and hastens inflammation of those organs, resulting in abscess. The duration of this disease is from one to six days. Death is caused either by suffocation or from accumulated poison acting on the brain. I saw no case of this disease while making my investigation for the department, and my account of it is taken from my record of the disease as it appeared during the winter of 1877-'78. At that time it spread rapidly, and I had no means of testing the period of incubation. Dissection showed the following morbid lesions: In the first stage, inflammation of throat with diphtheritic exudations on fauces, and inflammation of all internal viscera. In the second stage, all pathological appearances were more positive. The glands of the neck were enlarged, and often contained pus; throat often a mass of ulceration, with diphtheritic membrane extending to windpipe; lungs inflamed and kidneys containing extravasated blood, and showing signs of commencing abscesses. In every case where the symptoms were severe and had continued for several days, abscesses of lungs, kidneys, liver, and spleen were observed, and putrefaction set in very rapidly, rendering examinations very dangerous. The specific cause of the disease, as stated in definition, is a septic poison, specific in type, and very contagious. It spreads more rapidly than either of the other fevers, and usually within two weeks after it obtains access to a drove it spreads to the entire herd, unless prompt and thorough means are adopted to check its progress. Although, probably, the most contagious of the specific fevers, it yields more rapidly to treatment and care, but if neglected it is more rapidly fatal, few that are attacked escaping with life.

Having treated of the three diseases I have found in swine, I will now glance at the symptoms and lesions which assist us in a diagnosis of the disease. In typhoid we have diarrhea, tympanitis (wind in bowels), very little eruption, and entire loathing of food. There is seldom much swelling about the neck, but there is ulceration of the bowels and loss of substance. In typhus we find costive bowels and lank flanks, except when filled out with solid feces; profuse eruption; except in few cases, considerable swelling of glands of neck, but not containing true pus. Dissection shows increase of tissue and deposit, frequently in coats of stomach and invariably around the ilio-cæcal valve; also accumulation of feces in bowels if they have not been relieved by purgatives before death. In either disease there is seldom much disorganization of internal viscera, unless in advanced stages, when tubercular deposits may be found in the lungs. In diphtheria we found constipation. There may be eruption, but this is not a uniform symptom; discharge of matter and blood from the nose and mouth, swelling of glands of neck, appetite not entirely absent, but, although the hog tries to eat, soon turns away from food. Dissection shows ulceration of throat, exudation and inflammation of lungs and kidneys, and in advanced cases inflammation, disorganization of kidneys, lungs, liver, and spleen. In diphtheria also the disease spreads more rapidly and is of shorter duration, except in cases of constipation in typhus, where death often occurs in a few hours. In all three diseases we have cough, rapidity of breathing, and fever.

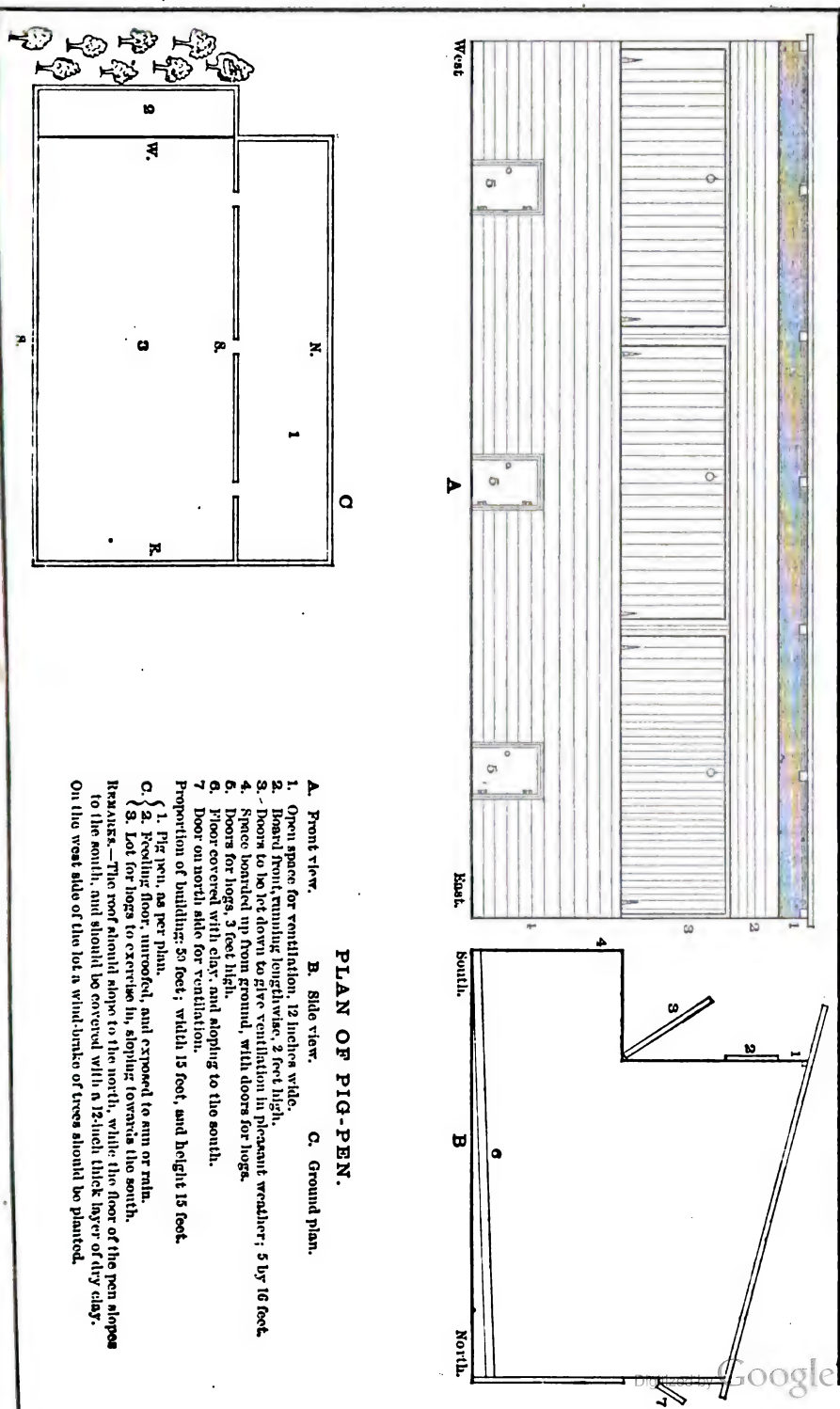
Predisposing causes.—Included under this head are any causes which have a tendency to reduce the vital strength of the hog, disorder the stomach, or deprave the blood in any way. These causes are foul air, food improper in quantity or quality, bad water, filth, malaria, atmospheric influences, scrofulous diathesis, unusual exercise and over-suckling. All of these causes combined cannot generate the disease, but any one of them, by reducing the vitality or disordering the system in some way,

may be the cause of the disease obtaining access to the drove. We will consider each cause and how it can be avoided. One of the common causes of disease among swine is confinement in a pen where the air does not circulate freely enough to carry off the carbonic acid expelled by the hog. The result is that from dark to daylight the hogs are forced to breathe an impure atmosphere. Many farmers build luxurious pens, tight and warm, and with an abundant ventilation only above, and abundance of straw below, forgetting that in such a house there is no ventilation, that, in fact, the breath, loaded with exhalation from the hog, is heavier than the air and sinks to the bottom of the pen. Even if, by reason of increased heat, the expired air attempts to rise, the cold air from above congeals the moisture and it falls as minute rain or snow. Other farmers build tight pens without any thought of ventilation and let the hogs pack in as they choose. In this case the air becomes very foul before morning with noxious gases, and if the owner would but put his hand within he would hardly find the air with sufficient power to sustain life. Now, it follows that we must have the pens so constructed that the swine can have pure air, at the same time the intense cold of our northern winters must be avoided, and either artificial heat must be provided or the heat of the hog utilized to increase the temperature where the surrounding atmosphere is below zero. We must remember that the natural haunts of the species in a wild state are in the torrid zone, and that swine are never found in a northern climate in a wild state except where they have escaped from domestication and become wild—that they are not provided with fur to protect them from extreme cold. Now, common sense teaches that when attempting to domesticate any wild animal his natural habits—food, climate, and mode of life—should be carefully studied. Again, effort has been made by careful breeding and feed to change the natural form and development of the hog—to raise a breed of swine with small bone, little muscle, and capacity for taking on fat while young, and these changes have been made at the expense of natural strength and endurance. It is a common remark among farmers that wild hogs do not have cholera, and acting upon this idea many farmers keep their hogs in large timber lots without shelter, and are disappointed to find disease appear and carry off a large proportion of the drove. In these cases, where the hog is not confined and forced to breathe foul air, but is exposed to the vicissitudes of weather, with loss of vital force by so-called improvement of breed, he becomes weakened and succumbs. I have noticed this particularly in regard to diphtheria; several large droves were almost swept away in a few days, although they had large range, pure water, and good food. This is true of diphtheria poison, but I have never known the other fevers to attack any isolated drove having pure air, clay soil in range, and good food, unless hogs having the disease were allowed in the same lot. The confinement of swine in close pens has another danger. The animal, heated by the confined atmosphere and damp straw bed, goes out at feed-call on a cold or rainy morning with its skin and hair damp from the accumulation of the gases which have congealed during the night. The cold, frosty air is a sudden change from the heated atmosphere of the pen, and bronchial lung irritation is the result. It is also wet, and this moisture, if it is a very cold day, is congealed, and the skin is chilled; and thus, from this error in care, the animal is exposed to a double danger. To avoid these dangers the pen should be so constructed that free ventilation can take place at the top, as it is absolutely necessary in a cold climate to utilize the natural heat of the hog to keep the pen at a moderate temperature. It will not do in winter to have any openings below to admit cold air,

hence we must use some absorbent for the poisonous gases constantly being exhaled by the hog, and the best and cheapest yet known to man is dry clay, which will take up a large amount of gas in proportion to its bulk. The dry clay will also assist in keeping the hog dry and clean, and with reasonable ventilation above the air will remain quite pure. The plan for a pig-pen annexed I have furnished to many prominent stock men, and all have united in stating that it is the most perfect plan they have seen. (See drawing of pig-pen.)

The lot should, if possible, have a clay soil surface, and the feeding floor should have a slope of two inches to carry off the rain that falls upon it. By having the floor open to sun, rain, and wind it is kept clean and pure; by having the lot sloping away from the pen, the rain will assist in keeping it clean by removing refuse matter from the surface. In this way nature assists the farmer in keeping his pens clean and healthy. No straw or other litter should be allowed in sleeping rooms, as it will accumulate moisture and give forth noxious air at all times. Straw should not be allowed in the lot, as it will absorb any poisonous vapors passing over, and birds coming from herds infected with septic disease will bring the matter on their feet, and it will retain its life in the straw. But on dry ground, even if it finds lodgment, it will soon be disinfected. The hogs should be furnished with pure fresh water in abundance, not only because it is necessary to health, but because water assists materially in producing fat. On the subject of food supply there has been much difference of opinion, and I can only give my own views and the scientific reasons for them. The prime object in feeding swine is to accumulate fat as rapidly as possible on those intended for market, to keep stock hogs in healthy growing condition, and to have brood-sows in the best condition for bearing and suckling young. Of course, to accomplish these objects the stomach must be kept in healthy condition and not overloaded; the food must be of due variety and in suitable quantities, and its character and quality must be considered. For stock hogs, of course, green food is absolutely necessary. The hog cannot thrive upon an exclusive diet of dry corn and water; but the green food must not be the exclusive diet any more than dry corn. If the hogs are kept on a clover lot, sour fermented slop should not be fed at the same time, but rather roots and vegetables, as potatoes, turnips, rutabagas, and beets, which contain large quantities of the soda salts, which the clover lacks. Hogs fed on corn may have sour slop to advantage, as this will assist digestion, and in this case prevent an undue acid condition of the stomach and blood. The hog's natural instinct will lead him to seek just what his system demands, and he will root in the ground not for the mere pleasure of destroying the clover-field, but to find certain salts necessary to health that cannot be obtained except from the ground. Then if you deprive him of the means nature has furnished for obtaining these necessities of life, you must furnish him with them in some other way.

Observing farmers have learned by experience that sickness in swine shows error in feed, and at once change to the opposite extreme. If feeding clover they change to dry corn, and if dry corn to clover. This rule has saved many droves from being swept off by infectious diseases. But I will give a rule which I have adopted in my investigations which is simple, but which at once tells the farmer what general course to pursue. If the herd is not doing well, if they do not eat well and appear less active than usual, at once examine the tongues of a few and notice the color; if the tongues are red and contracted give sour slop or turn them on clover pasture or on green food, and they will at once improve. If their tongues are large, pale, and flabby, give corn, corn-meal, cooked



root vegetables, and add soda to the feed, or soda and milk, but give no sour slop. The large, white, pale tongue shows that the stomach and blood are in acid condition and need alkalies; the contracted red tongue shows a subacid condition, and that acids or sour remedies are needed. For years the farmers' journals have lauded clover-fields and advised keeping swine upon a clover range during the entire summer, on the score of economy of feed and health. As far as it goes this is good advice, and yet following this advice has been the chief cause of the spread of the contagious diseases among swine. When the clover range is on clay soil, or the hogs have access to clay banks, and the use of rings is avoided, all will go well, but if rings are used in the nose, or the soil is exclusively black loam and no other food is furnished but the grass and water, or, perhaps what is worse, sour slop in addition, an acid condition of the blood is engendered. The hog becomes debilitated and peculiarly liable to any contagious disease which may appear in the vicinity. Of course farmers must keep their swine on grass and clover, and, as a matter of economy, must use rings to prevent the clover from being rooted up when the range is limited, but they must at the same time study the natural habits and food of the species and supply that food or its constituent elements in some form. The natural food of this class is not a vegetable diet, but they were designed by the Almighty so that they could obtain those roots from the ground. When, therefore, they cannot obtain them, they should be furnished in kind. As a rule, the constituents of all grasses and annual plants are acid—have an acid reaction. Especially is this the case with clover. Root vegetables have an alkaline reaction, and are composed largely of phosphates and soda salts. In clay soils the hogs can probably supply themselves from the ground with phosphates, but when confined to a black, loamy soil they can obtain but little of these necessary salts from the earth. A noticeable fact is, that no matter how wide the range the swine will select the bare points to root in rather than the soft loam. Where root vegetables cannot be obtained and hogs are kept on clover range, soda and lime or sulphate of iron should be given regularly. Dry corn as an exclusive diet is not a natural food for hogs, and some additions should be made to the bill of fare. Turnips, potatoes, or some other cheap vegetable must be added to insure good health. I know there is a bitter feeling among many farmers against cooking or grinding corn for food, on the score of extra expense and trouble, but I have never yet known a farmer abandon the practice when once thoroughly tried. It will pay any farmer to grind and cook the corn fed to his hogs, even if that staple is worth but 13 cents per bushel. Practical farmers, who have made the profitable feeding of hogs a study, report that one pound of cooked corn-meal is equal to one and one-half pounds of raw meal, and to three of whole corn, in fat-producing power. One advantage in feeding cooked feed is that root vegetables can be combined with corn-meal and cooked at the same time. Where raw corn is used as a steady diet sour slop will assist in its digestion, and should be given regularly to prevent as far as possible the evil results of error in diet. The use of coal, charcoal, ashes, and rotten logs in the pen assists in keeping the hogs in health by supplying certain chemicals needed by the animals. I have been thus particular in speaking of errors in diet because I believe that this cause more than any other has helped to spread the fatal diseases among swine. A single hog with diseased stomach may be the cause of imparting the malady to a herd, and having thus obtained a foothold it may, unless prompt measures are taken, spread to the well

hogs, which would, if it had not been for the one or two unhealthy ones, have escaped infection.

The water should be clean, pure, running water, and should be within reach of the hogs at all times. Stagnant water, covered with green scum and loaded with organic impurities, is unfit for hogs to drink, yet many farmers furnish only such to their swine. Foul air, by vitiating the blood, is one of the common predisposing causes of disease. I have already spoken of the influence of heated air on the health of swine, and the evil effects of sudden changes, but I did not mention the depressing influence of the foul air itself upon the animals. Swine breathing air loaded with carbonic acid and ammoniacal gas for half of each day cannot remain healthy any more than man can, and the same natural results will follow—impure blood, disease of lungs, and other viscera. A pen erected on the plan set forth in diagram will remove this cause of disease. The dry clay is the best and cheapest disinfectant yet discovered, and will absorb the poisonous gases and render the air pure. Even though a large number of hogs are confined in a limited space, by opening the large doors on the south side on a clear day the sun's rays will dry the clay and renew its absorbing powers.

Scrofula is another common predisposing cause, and one of the principal causes of the large mortality in diseases of swine. The two chief causes of the scrofulous diathesis are breeding young sows and in-breeding. In order to avoid these causes sows should not be allowed to become pregnant until one year old. By that time she has matured and is fitted to bear young. Before that time she is growing and is immature. Not only the mother may be injured by early breeding, but the progeny will inherit disease. In-breeding has been largely practiced in the Western States, and whenever practiced it is easy to pick out the young resulting from this management. They were the first of the pigs attacked, and the *post-mortem* examinations disclosed tubercular disease in every case. Before the close of the investigation I became so thoroughly convinced on this subject, that, whenever I detected tubercular disease in lungs or mesentery, I sought out parentage of the pig. In several droves where a portion of the diseased swine were the offspring of in-bred sows and part cross-breed, the tubercular disease was found in the former and not in the latter. In-breeding is often practiced through the effort to obtain a perfectly pure breed of any particular species. With but few exceptions, and those among the imported stock, the pedigree does not extend back more than one or two generations, and often unwittingly the same blood is infused into a drove of sows, although the male may have come from a distance. To avoid this grave error, I would advise crossing breeds, selecting carefully the male from some special breed, as Poland-China, and crossing with an opposite breed in shape and habits, as the Essex. The finest drove I saw this year was the result of such a cross. Mr. Pendroy, of Monroe, Jasper county, bred two years to Essex boar and two to Poland-China, making a special effort to obtain as different blood as possible from that in his own herd. The herd of nearly three hundred head were in fine health, except some brood-sows which had been suckled down and were poor. These sows contracted the disease, but it was promptly checked by proper measures, and did not spread to any extent in his drove.

And this illustrates another very frequent cause of the contagious diseases obtaining a foothold in a herd of animals. The brood-sows become worn down with oversuckling and want of suitable food during pig-bearing and nursing, and with systems thus disordered are very liable to contract any disease in the vicinity. See that brood-sows have

root-vegetables and milk, and that soda is furnished them liberally with green food, and they will not become so emaciated and debilitated.

Malarial influences can affect swine as well as man, and is one of the most troublesome and fatal of complications in infectious fevers in their first stages. The low sloughs, covered with green mold and surrounded with rank vegetation, are not the most healthy resting places for swine or any animal, biped or quadruped, especially between the hours of sunset and sunrise. The plants are giving off carbonic acid gas during the night, and the wet ground, loaded with organic matter, is giving off malaria. If the hogs are allowed to breathe this poisonous air their blood becomes vitiated and health is impaired, as in man. Typhus and typhoid fever find a favorable location for incubation here. To avoid these two causes combined, impure water and malaria, let the drove be gathered in at sundown into a large pen on high ground with sloping surface prepared, and kept there until the morning sun has dispelled the perceptible mists. If the day is inclement the drove may be allowed to range two hours after the hour for sunrise. They should be furnished pure water to drink before leaving, if they are to be confined in a range with stagnant water. Many will say that all this trouble will entail increased expense; but it has not been found more expensive where tried. Swine, like any other domesticated animal, can be trained to regular habits, and a drove can be trained to return to its sleeping place, if a small quantity of food is furnished them each night until the habit is formed.

Unusual exercise, which debilitates the hog and weakens his vital force, is another cause of the inception of contagious diseases. In several cases which have come under my observation, choice hogs for breeding purposes were purchased from apparently healthy herds, taken on cars and wagons a considerable distance, and after their arrival showed signs of disease and eventually died. In a few days others in the herd to which they had been taken were affected, and thus the disease was spread from a new focus to a large number of droves. I, of course, could not state where these hogs contracted the disease. When they started from their first home they were probably in perfect health, but confined in a close box and jolted around in a wagon, or confined in cars with irregular or unusual feed, and nervous excitement as additional causes, brought on a gastric irritation, and during these travels they were exposed to a contagious illness more or less intense, and their system being in a condition to receive and take up the poison, it found a lodgment, and after a stage of incubation showed itself by outward symptoms. Hogs brought from strange droves should invariably be kept in strict quarantine for at least fourteen days, no matter how perfect the bill of health they bring from their former owners. Neglect of this precaution has been the cause of the spread of the disease from new points, and many counties could trace the disease which had carried off thousands of hogs to a single imported animal. In one county visited in Western Iowa, which had previously had no swine disease, an estimated loss of over \$100,000 worth of hogs was claimed to have been sustained during the past year, and this disease started from a central point—a single imported hog. (I use the term imported as meaning from a distant county, or another State.) The disease spread to the drove in which it was placed, and from that drove to adjoining herds. Several expensive lawsuits for damages and much ill-feeling between stock-men might have been avoided by attention to this point.

We will now take up the subject of treatment, which naturally divides itself under two heads—*Preventive* and *Curative*. Each of these can be

divided into two classes, hygienic and medicinal. The whole secret of success in preventing the inception of contagious diseases by hygienic care, as has been already pointed out, can be included under two rules, viz., keep the system of the animal in a healthy state, and avoid exposing it to poisonous, contagious influences. We have already shown how the first rule can be followed with success—by fresh, uncontaminated air, suitable food, fresh water, seasonable exercise, and avoidance of low, damp places for sleeping quarters; also avoidance of those causes in breeding which are known to engender the scrofulous diathesis. The second requires that all dead organic matter, such as straw, hay, litter, and other matter, which is liable to catch the poisonous fungi floating in the air or carried along by the wind, should be kept away from the animal. All strange hogs must be kept in quarantine for fourteen days before being allowed to run with healthy herds. If there is any disease in the vicinity, especial care must be taken that no man, vehicle, or animal from infected localities be allowed to pass over meadows where healthy hogs are allowed to range; and if any stream passes through your range from an infected district, the stock must be kept from the water, as water will hold the poison and keep it alive for a considerable time. The yards and pens where the swine stay at night must be kept clean of cobs or other organic matter, so that the rains can wash the surface clean. All swine, either brood-sows, shoats, or pigs, not in general health, or showing evidences of debility, should be kept away from the drove and carefully treated, the causes of sickness removed and effects remedied. No medical treatment can be positively recommended as a preventive for contagious diseases. Remedies may be used to correct any derangements of system, as has already been recommended—soda, if the tongue is broad, flabby, and pale; acids, if the tongue is narrow, red, and contracted. In sows worn down with nursing, nothing can have a better effect and improve their condition more rapidly than soda and sweet milk or buttermilk. If the bowels are constipated, Glauber salts may be given in doses of one-half to one ounce to each hog, or one pound to every thirty hogs, once a day, until the bowels are acted upon. Salt should be furnished to all swine, in small quantities, every day. If any contagious disease is in the near vicinity, hyposulphite of soda in milk or fresh slop, given every morning on an empty stomach, offers the most reasonable hope as a preventive, and if the disease is diphtheria or typhoid, belladonna should be added. There is much difference of opinion in regard to the power of belladonna to prevent the spread of the septic diseases, diphtheria and scarlet fever. From my own observation I base the belief that it is a positive preventive or prophylactic, and on that account I extend its use to swine, and have recommended its regular use in small doses whenever diphtheria or typhoid was prevailing. As a preventive, the following would be a good formula for general use: Saturated solution of hyposulphite of soda, one gallon; tincture of belladonna, one fluid ounce. Of this mixture, give one gill to every twenty hogs in slop every morning on an empty stomach. Believing that all the contagious diseases are received into the system through the mucous membrane, and that any agent having power to destroy these minute fungi before their absorption will prevent the disease, I have for years recommended the use of chlorate of potash or sulphate of soda as preventives when persons are exposed to any contagious diseases. As typhoid has but a limited power of contagion, I cannot say positively that the remedy has prevented the spread of that disease; but I have never had a second case occur in a family where the remedies I recommended were used regularly. I would therefore recommend this formula to be used once

a day where contagious diseases are in the near vicinity to diminish the chances to the lowest point. If the tongue is pale and broad, bicarbonate of soda must be added to neutralize the acid in the stomach, also sulphate of iron in doses of five grains will be found useful.

The curative treatment like the preventive must be both hygienic and medical. If disease has appeared in a herd prompt measures must be at once taken to prevent its spread. The sick must be immediately separated from the well. All organic matter, such as hay, straw, and litter, to which the hogs have access, must be burned, the lots cleaned up, and every possible effort made to destroy contagion. The well hogs, if possible, should be at once placed upon fresh ground; that is, on ground over which the sick hogs have not passed since a heavy rain cleansed the surface. Any disorder of stomach or general system should be at once corrected, and at least once a day the remedy before mentioned should be given in slop. Each day all hogs in well herds showing symptoms of disease should be at once separated from the others. Where the season will permit, especially in cases of typhoid fever, keep the entire drove on plowed ground, and have the ground harrowed every day to insure thorough mixture of fecal matter with the soil. Keep the sick hogs on a dry clay floor, with free ventilation, and protected from cold wind and rain; feed nothing but cooked slop and milk, and these only in limited quantities, adding the medicines recommended with the slop. In typhus and diphtheria the important point is to relieve the bowels as speedily as possible, and for this purpose castor-oil or saline cathartics must be freely given until the object is accomplished. In typhoid, diarrhea is a prominent symptom, and cathartics should be avoided. When the animal is a valuable one and will repay the trouble, injections of warm soft water into the bowels will be found the best plan for moving the same. The injections should be repeated until the bowels are well acted upon. In diphtheria the important point is to neutralize the poison as rapidly as possible, and eliminate it from the system. This can be effected with the sulphite and belladonna. The following will be found a useful formula, viz: Saturated solution of sulphite or hyposulphite of soda, one quart; fluid extract belladonna, three drachms; fluid extract aconite, two drachms. Of this mixture give one gill to every sixteen hogs five times a day, in a limited amount of milk or cooked slop. If the glands of neck are swollen to such an extent as to threaten danger from suffocation, oil of turpentine and sweet-oil may be freely applied externally. By following these directions in treatment few, if any, of the hogs suffering from diphtheria will die, and recovery will be rapid and permanent. When a good article of the powdered herbs can be obtained, the following will be found preferable to the tinctures and fluid extracts: Sulphite or hyposulphite of soda, five pounds; sulphur, two pounds; powdered belladonna leaves, four ounces; powdered aconite root, two ounces; powdered elecampane, a half-pound; powdered ginger, two ounces, and mix thoroughly. On one pound of the powder pour three quarts of water (boiling); add a quart of molasses, stir and cover. Of this mixture give one gill to every fifteen hogs, or one tablespoonful to every hog, in a little milk, four or five times a day. The medicine should be kept in a stone crock or wooden bucket—not in a tin vessel. In typhoid fever the condition of tongue is our principal guide to determine treatment. The sick will, as a rule, utterly refuse food, and very little medicine will be needed. Carbolic acid in milk, in doses of two to five drops in one pint of milk, as often as the hog will drink, or three times a day if given by force, will accomplish a good purpose if added to medicine, and oil of turpentine may be added as a useful adjunct. If

the tongue is red, muriatic acid, diluted in doses of ten drops in a little slop, can be given as often as the hog will drink, or the water may be acidulated with the acid. Where there is a large number of hogs sick it will be impossible to attend each one. I would therefore advise the use of these remedies to all the sick, not attempting to treat special symptoms in each case. If the disease is promptly treated as above, the first symptoms of typhoid may be destroyed, and the hog will improve at once, but if treatment is delayed the case must run at least a nine days' course. Great care must be exercised in returning to solid food, as this error may render a hog worthless that might have entirely recovered from the effects of the disease.

Under the above course of treatment I have succeeded in checking the spread of the disease, and a large majority of the sick hogs have recovered.

Treatment of typhus fever.—I must confess I have not had any very flattering success in the treatment of this disease, and can only give my views and recommendations and the reasons therefor, hoping that some of my colleagues may have been more successful. As mentioned before, the bowels must be relieved either by saline purgatives or by injections. This is an important point, as impacted fecal matter is a frequent cause of death. Another important point is to keep the hogs on a large range, scattered as much as possible, as crowding together only increases the intensity of the poison. Internally give as follows: Bromide of potassium, $\frac{1}{2}$ ounce; bromide of ammonia, $\frac{1}{2}$ ounce; gelsemium (fluid ex.), 2 ounces; aconite (fluid ex.), 2 ounces; capsicum (tr.), $\frac{1}{2}$ ounce; water sufficient to make 4 ounces. Of this mixture give one teaspoonful to each hog three to six times a day, in milk or slops. After the bowels have been freely moved the amount of podophyllin (may-apple) must be reduced. The same remedies can be obtained in powdered form and given in infusions: Bromide of potassium and ammonia, of each one-half ounce; powdered gelsemium and powdered aconite root each one-half ounce; powdered capsicum (cayenne), two drachms; powdered elecampane, one-half ounce; powdered podophyllin, two to four drachms. Upon this powder pour one quart of boiling water, stir and cover, and give a tablespoonful to each hog twice a day, or oftener, in a little slop. The same medicine may be given to the well animals as soon as they are separated from the sick. It should be given on an empty stomach every morning. The great difficulty in obtaining powdered drugs is that most of the powdered vegetable drugs have been kept so long in stock that the medicinal properties are lost, and are perfectly inert. I would, therefore, advise the use of fluid extracts in preference to powdered medicines, unless a reliable article can be procured.

The following may be considered the best general treatment for a drove of hogs attacked with contagious disease: Separate the sick from the well animals; keep the sick on bare and fresh ground, not having been passed over by diseased hogs since a heavy rain. If constipated, see that the bowels are moved either by using salts, oil, or injections. Protect them from inclement weather, and give internally, if the tongues are large, white, and flabby, soda, hyposulphite and bicarbonate, each one-half drachm, sulphite iron five grains, belladonna leaves two quarts, powdered aconite root two grains, elecampane (powdered), twenty grains, once a day to well and three times a day to sick hogs, in milk or fresh, rich slop. If tongues are red and contracted, give water and slop acidulated with muriatic acid to all, and to sick hogs give bromide, gelsemium, and mandrake, in regular and free doses. I would particularly caution the farmer not to rely upon medical treatment to the exclusion

of hygienic care, but rather to follow carefully the directions set forth for the case of swine, and make the medical treatment an auxiliary.

A few words may be proper in regard to worms in alimentary canal. I have found no species of worms which could be strictly included under the head of contagious diseases, or could in any way be called a cause of the disease to which swine are subject. I have seldom examined a hog in any stage of the disease without finding worms in some form. The long, round worm in the stomach, and frequently the small thread-worm in the cæcum, have been found. These worms are natural to the swine and to all domestic animals. They may increase in numbers and cause trouble, but they are not the disease or the cause of the disease, but rather an effect of the condition of weakened mucous membrane which has increased the parasite. Oil of turpentine, in milk or slop, given once a day (preferably on an empty stomach), will expel those worms when so numerous as to affect health. I have received many letters from farmers and proprietors claiming that the worms were the specific cause, in fact the disease itself, and approving remedies to meet their single indications. I will therefore state emphatically that, in the dissections I have made, numbering over one hundred, I have found no form of worms which are not frequent in health, and have found no foreign parasites of any kind that could be detected with the naked eye that could possibly be a cause of the disease of swine. A careful examination of the liver, lungs, spleen, and kidneys with a powerful microscope may disclose some minute animalcula or parasite (as I said before, I found I could make no practical use of the microscope in field); but even these minute objects are but an effect, and the poison germ lies behind as the cause of the depraved system which has permitted the parasite to find a home. There is one disease known as kidney-worm, of which I have heard almost every farmer speak, but I have not seen a specimen of the parasites, although I have dissected a number of hogs which farmers claimed were suffering with this affection. I invariably found inflammation of kidneys, but no worm visible to the naked eye.

There seems to be a general belief among farmers that rings are a strong predisposing cause of disease, and, instead of meeting the opposition to this theory which I expected, I find that careful observers are willing to admit the truth of the statement, and either abandon the rings or furnish the food which is cut off by their use. In Jasper county, which has a rolling, clay soil, and the hogs generally have extensive ranges, I particularly noticed the fact that, in a ride of fifteen miles through a thickly-settled country, the droves in which rings were used were invariably sick, and in those in which they were not used there were no sick animals. In one drove only the brood-sows were rung, and these alone were attacked at the time of my visit. Although this is but one isolated county, yet it furnishes food for reflection. I do not claim that clover does not contain potash and soda (sodium) in a neutral form. The claim I set forth is that this food has an acid reaction in a green state; that it contains an excess of vegetable acid; and that confinement to this diet will induce flatulency and dyspepsia in any omnivorous animal. It is the natural food of horses, cattle, sheep, deer, and buffaloes, but not of swine; and the anatomy of the hog proves the statement. My claim is that no omnivorous animal can remain in health on an exclusive diet of green clover. I append the following notes from my daily journal: John Nimick, near Washington, Iowa, had a breed of Chester Whites, mixed with Berkshire. Pens, filthy; range, timber, with clay soil and grass; food, soaked oats after they had been taken sick; good water. Had ninety-four head; sixty-seven died and seven

recovered; seven now sick. Symptoms: diarrhea, prostration of strength, tympanitis. Dissection of one hog one year old showed great emaciation, tympanitis, little change in liver, lungs, spleen, and kidneys. Bowels were expanded with gas, and there were a number of ulcers situated at seat of solitary glands. The disease was typhoid fever. No treatment was attempted, as the man refused to follow instructions; but the slowness of progress under the rather unfavorable circumstances showed the slight contagion there is in typhoid, as merely turning the drove out on a different pasture had alone checked the rapid progress of the disease, although sick and well remained together.

John V. Anderson, Washington, Iowa. Poland-China herd; on grass and away from straw or manure when attacked. Soil, black loam; water, open ditch; intense heat, 99° F., at time of attack in July; disease in near vicinity, and had been in this herd three weeks. The owner had lost seventeen hogs, fifty-eight shoats and pigs, and had remaining thirty-eight hogs and three pigs. The disease had spread gradually, and was killing two or three per day. The symptoms were the same as in last drove—pale, large, and flabby tongue; diarrhea; tympanitis. All sick. I ordered milk and lime-water, and ground cooked feed made into slop, and limited quantities of soda bicarbonate and hyposulphite (each five pounds), sulphite iron (one pound), given at the rate of one pound to drove of thirty-eight hogs twice a day. Mr. Anderson reported that all the sick animals recovered except three pigs, two of which were sacrificed in the cause of science. This man did not allow in-breeding; no scrofulous taint was detected in dissection; he did, however, use rings, which I consider were the predisposing cause of the disease in this herd.

W. J. Hamilton, Washington, Iowa. Breed; Poland-China; feed, growing rye and dry whole corn, with slough water for drinking. Pens clean, large range, but soil black loam, and rings used in nose. The disease had continued ten days, during which time ten had died and thirty-five had been attacked. Dissection of a few of the sick showed tubercular disease, and the gentleman stated that he had been in-breeding for some time. The same treatment was adopted as in the last case, but report showed no beneficial results when used with sick hogs, or in preventing the spread of disease.

Amana Colony, Homestead, Iowa county, Iowa. Breed, Poland-China; pens in poor order; feed, corn and slop. No disease had been known in the colony for twelve years. In July the agent purchased in Iowa City five boar pigs, and they were hauled to depot and forwarded on cars to Homestead when it was intensely warm. On arrival one of the pigs refused to eat, and was put in a small pen in breeding-house, where it died a few days afterward. On the fourteenth day the hogs in pens on each side of the one occupied by infected hog were taken sick and died, and the disease gradually extended until over two hundred had died. Two of the five boars were sent to the North Amana Colony, and in five days refused food, sickened, and died; and in nineteen days from their arrival the pigs in pens on each side of the one containing sick boars were taken sick and over five hundred died in a few months. In each of these cases the disease appeared first only in the pens immediately adjoining the infected pen, and afterwards spread to the other pens. The other boars were carried to the other colonies of the society, remained well, and no disease appeared in any of the seven settlements except the two mentioned. I visited the man from whom the boars were purchased, but could elicit but very little information. He stated that his "hogs had cough, as all hogs had, and that he had lost about thirty-five head by the intense heat, they being very fat, but that no disease

had appeared in his drove; and, further, that he lost no hogs for some weeks after selling those to the colony." It may have been that these hogs had the poison germ in their system before starting from home, and might have succeeded in throwing off the poison if they had been retained at home; but worry, fatigue, and confinement during excessively hot weather, in a close box in a tight car, was enough of itself to reduce the animal vitality to a low ebb, and give the most favorable encouragement for the disease.

Respectfully submitted.

ALBERT DUNLAP, M. D.

IOWA CITY, IOWA, December 3, 1878.

REPORT OF REUBEN F. DYER, M. D.

Hon. WILLIAM G. LE DUC,
Commissioner of Agriculture:

SIR: Having been appointed by you to investigate the diseases of swine in this locality, I entered upon that duty August 1st, which duty was to extend over a period of two months. Having performed that duty to the best of my ability, I now proceed to make a detailed report of my investigations.

Having carefully noted the origin and spread of the epidemic among swine in this county, which first made its appearance on the farm of Mr. William O'Mera in May, 1877, the report I am now to make will commence at the time when, from that starting point, the disease has become quite universal in this locality.

In order to thoroughly understand the cause of the disease, I will commence at Mr. O'Mera's farm. He is situated on the bottom-lands of the Illinois River, close to the bluff, which rises some 60 or 70 feet. His hog-yard, which comprises about one acre, is close to the Chicago, Rock Island and Pacific Railroad, so that his herd was exposed to any contagion that might be transmitted by moving stock-trains. An instance of this kind occurred in the case of Mr. A. Holderman's herd, which was attacked about one month ago. There was no diseased herd within several miles of his place, but the same railroad passes through his farm.

The same condition is seen again in this town near the stock-yards of this railroad. Pigs confined in pens near the stock-yards have been infected in the same manner. Also on the Chicago, Burlington and Quincy Railroad, where the railroad crosses the Illinois and Michigan Canal, a Mr. Loudergrau had some pigs confined in a pen close to the railroad. The trains stopped directly opposite his pen to take in water, and his pigs became diseased. As it is a well-known fact that these roads have been shipping diseased hogs, it appears quite evident that these points became infected by disease transmitted by the railroads, and also by wagons transporting hogs to market.

Owners of hogs, as soon as the disease attack their herds, and sometimes before, sell all fat animals, hauling them to market in wagons. All along the road thus traveled herds will take the disease, and it is probable that the herd so attacked is infected by hogs thus transported. This is evidenced in the manner in which it is distributed, as one herd will take it, and then it may pass two or three farms before another one is infected, and this peculiarity of attack is only observed on roads over which diseased as well as dead hogs are hauled. When not carried in

this or some similar manner, but left to its own natural course, as a rule it moves steadily along, taking in each farm in turn. There are but few exceptions to this rule.

In the northern part of this county it is particularly observed on roads over which dead hogs have been transported that hundreds of animals are suffering all along the line of these roads with the same peculiarity of attack as is witnessed by the live diseased hogs passing. In view of these facts, it is fair to presume that Mr. O'Mera's herd contracted the disease from the stock-trains on the Chicago, Rock Island and Pacific Railroad. From this herd it began to spread to the adjoining farms, going up the bluffs to herds on farms situated along the bluff.

In June, 1877, it struck Mr. A. Strawn's herd, and he lost very heavily. West of Mr. Strawn's it attacked Mrs. Hardy's herd, and she lost nearly all. The next farm west, which was only separated by a common board fence, on each side of which hogs were confined, it did not attack, and the owner attributed his immunity to adding sulphur to the swill fed his hogs; but it went east, taking several farms, and was only arrested for want of material to prey upon.

From Mr. O'Mera's it crossed the Illinois and Michigan Canal, and extended east and west up and down the Illinois River.

Mr. J. Delbridge had a herd of young hogs, which he sold late in the fall at an auction sale. At the time of sale it was not supposed that his herd was affected, but the heard adjoining his had been dying for some time. The sale was made, and different parties purchased the pigs, took them home, and placed them with their own hogs. In a few days after it was noticed that these pigs were diseased, and every herd in which they were placed, without a single exception, was attacked by the disease in question. In the herds thus contaminated the disease lingered until the spring, but it did not spread much until warm weather, and since the growth of vegetation became rank it has spread all over the southern part of the county, destroying not less than \$50,000 to \$70,000 worth of hogs up to this time, and it is still raging. One great source of spreading the disease is observed by the small pigs wandering to the herds of adjoining farms, and thus importing the malady. Farmers usually confine their hogs in lots only sufficiently fenced to keep in the large ones, hence the small pigs readily escape and gain access to other herds. Many farmers tell me that when their herds are sick they do not know what becomes of the small pigs, as they all disappear and seldom return. When asked if they know how their herd contracted the disease, they very frequently answer, "Well, one morning I noticed a strange pig in my herd which was sick, and in about ten days or two weeks mine began to die." Another instance proving that the disease is transmitted by those infected occurred only a few days ago. Mr. Dunlavy, who lives north of the Illinois River, in Ottawa township, purchased five pigs from a Mr. Poundstone, who lives in the infected district south of the river. Soon after Mr. Dunlavy placed those pigs in his herd he noticed they were sick. Two of them soon died, and this morning he tells me he has lost seventy of the remainder of his herd and all his small pigs; also lost eleven of his fat hogs. He had one hundred and ten head, all told. Mr. Poundstone tells me he has lost his own since selling those to Mr. Dunlavy.

The same rule holds true by placing well pigs in a diseased herd. In March last three well pigs were placed in a diseased herd, and in a short time they were taken sick. This shows that the disease retained sufficient vitality through the winter to impart itself in the spring. I carefully examined three of these cases, and found the disease a typical case.

Only one of them had then died. I might go on and illustrate by a good many examples to prove the contagiousness of the so-called hog-cholera.

The mycetic theory, which is now so popular among scientific men, and which ascribes the disease to parasites of the lowest form and smallest size, would seemingly offer the only explanation for this disease. It cannot be a toxic poison, as no one has ever been able to demonstrate an organized poison as a cause of any contagious disease. The lowest forms of organisms live in the air and in water as well as when attached to solid bodies. A specific germ, a favorable medium of development, and contact with the animal to be infected are fundamental conditions for the development of the disease and its diffusion; and every perturbation, every solution of continuity in the chain of these factors of development may prevent or lessen its destructive action.

From numerous observations I am convinced that the moving of dead animals does not import the disease as readily as do the live ones. I am led to believe that putrefaction diminishes the capacity for infection, and that the bacteria of decomposition is destructive to the germs of the disease. It is a well-known fact that one low form of organism is destructive to another low form. Climatic influences have but little control. I think that warm weather acts more favorably to the formation of the infecting germ. Along belts of timber it readily spreads; it also extends out on the prairie where the growth of vegetation is luxuriant. Contact of diseased with well animals imports it under all circumstances, climate having no influence to prevent its spread. As to diet and care, it matters not how well or how poorly fed, or how cleanly kept, if such well-fed hogs come in contact with the disease, they are as sure to contract it as those that have no care. Where not caused by other means, the prevailing wind gives the direction or march of the disease. The greatest distance that it has been carried by the wind, in any well-authenticated case that has come under my observation, is two miles. As a rule, a greater or less number of animals in every herd will escape the disease, or have it so lightly as not to interfere with their doing well.

It appears that quantity as well as quality of the germ, and aptitude of the animal to receive it, are the conditions which influence contagion. Some animals possess an absolute power of resistance. Trousseau says that "there are individuals who pass unharmed through every kind of an epidemic, be it influenza or cholera, scarlet fever or measles, small-pox or typhoid fever. There are individuals whom it is impossible to affect with the vaccine virus; inoculate them twenty times, and you will obtain no result. If I may use the expression, 'the soil is barren,' and in it the seed cannot germinate. There are others again in whom the power of resistance is only temporary. It is in general difficult to find out the condition upon which this power of resistance depends. It is known that the ability to resist contagion varies with the age of the individual. There is less power of resistance in the youth than in the old man. One attack of a contagious disease generally confers complete immunity from any subsequent contamination. Occasionally it may be repeated, but these exceptional cases do not at all invalidate the general rule."

The same writer still further says: "It would appear that virus or morbid matter, upon its entering the economy for the first time, puts in motion all therein that is fermentable, and so thoroughly destroys it that the leaven—the contagion—when introduced again, finds nothing whereupon to exert its action."

Wilson says: "That in every epidemic there is always a great variety in the gravity of the disease, some cases being very serious, others very

slight, without any apparent cause for such difference. Sometimes an epidemic begins with moderation and closes with severity, and *vice versa*."

Trousseau holds: "That every contagious disease must have a spontaneous development, as contagion necessarily implies the presence of two individuals, one the giver, the other the receiver, of the morbid germ." This remark he follows by another which modifies it: "While there is every reason to believe," he says, "that at present there are some diseases, such as syphilis, small-pox, and measles, that are always reproduced by contagion, there are other maladies which we see arise spontaneously."

I believe it is now generally conceded that all diseases that pass through a regular period of incubation are contagious or infectious, and that they depend upon a morbid germ for their development. In several of the contagious diseases the morbid germ has been discovered by the microscope, and in all probability the morbid germ in all contagious diseases will yet be discovered, as has already been the case in the measles, small-pox, whooping-cough, scarlatina, typhus and typhoid fevers.

Lubermeister, in his introductory remarks on acute infectious diseases, says "that a peculiarity of infectious diseases, which they have in common with the poisons proper, or intoxications, but by which they also differ in the most marked manner from all other diseases in their specificness, which shows itself in the fact that always and under all circumstances a given kind of disease is solely due to a given kind of morbid agent or cause. There is no such constancy between cause and manifestations in other diseases. Exposure to different degrees of cold will produce different affections. * * * On the other hand, vaccination with the virus of variola only produces variola, if any disease at all is produced by it; vaccination with the vaccine matter only produces vaccinia; the infection from a patient with measles only produces measles, and never anything else, and *vice versa*. Whoever, therefore, is affected with small-pox, measles, syphilis, &c., is certain that he has taken the disease by becoming infected with small-pox, measles, syphilis, &c., and of no other disease. In infectious diseases the predisposing cause, which in most other diseases plays a more important part than the exciting cause, is to be considered only in so far as it may determine the severity of the disease. The kind of disease is entirely independent of it. Various physiological conditions may induce other pre-existing affections, and are influential in so far as they may increase or diminish the susceptibility, but the kind of disease will not be determined by it.

"Through the longest series of generations diseases preserve their specific character with the utmost persistency, and if at times some of these characteristics are not brought into complete maturity, owing to an unfavorable field for their development, they assume them again as soon as they are planted in favorable soil. The weather, the period of the year, the climate, the conditions of the soil, &c., conduce to, or prevent the spread of, an infectious disease, but they never change the nature of the disease. The kind of diet and all other physio-chemical influences act indifferently with regard to the nature of the affection, and one infectious disease is never changed into another. The doctrine of specificness would arise, as a necessary consequence, from the hypothesis of a contagion vivum, even if it were not already proved by the facts. From the specificness of infectious diseases we naturally conclude that they never arise spontaneously, but are dependent upon a transmission or continued propagation of the diseased person."

When a hog is attacked by the disease in question, the first thing that is usually noticed by the owner will be that it has refused its food; it walks slowly along with its nose to the ground. The attack may or may not be preceded by a cough, but a cough is usually noticed in starting the animal from its resting place. It is inclined to hide itself in its bedding. Sometimes a distinct chill will be noticed, the animal shivering or shaking like one with ague. There may be bleeding at the nose, also bloody urine. The bowels may be loose or costive. Usually in small pigs a diarrhea will be observed, sometimes quite severe and producing pains. Vomiting is often present, and many cases, especially among old hogs, where this is the case, they recover, while others in the same herd that do not vomit or have diarrhea die. In many herds quite a percentage of all that have an active diarrhea recover, while in other herds that are not thus affected, nearly all die. A swelling of the face, ears, watering of the eyes, increased saliva, and also increased discharge from the nose, are all symptoms of the disease. The genitals in sows will be frequently swollen; an eruption over the entire body; in some cases quite red, in others dark discolored spots appear. Some limp off as if lame in all the feet; others only in one foot. Some are attacked by convulsions. The fever runs high for four or five days, if the animal is not sooner destroyed. In fact, all the tissues of the animal suffer more or less as though the poison affects all. The mouth and throat often have a diphtheritic appearance, and bronchitis and inflammation of the lungs supervene with pleurisy. On *post-mortem* examination during the period of incubation you will notice the capillaries of the lungs already inflamed and bursting. Later, a circumscribed interlobular inflammation; still later, gangrene of the lungs. The liver may be inflamed, also the mucous membrane of the stomach and intestines. The kidneys sometimes present traces of inflammation; in some the peritoneum with slight effusion into the abdominal cavity. The temperature during the fever often runs very high, from 107° to 108° F., but some time before death it decreases. The same or nearly the same temperature will be observed morning and evening. There are exceptional cases that have come under my observation.

Among the affections of the nervous system is an inflammation of the meninges with rigidity of limbs, spinal meningitis, muscular paralysis, and convulsions with eclampsia.

Among inflammations may be mentioned that of the pericardium, gangrene of the lungs, interlobular inflammation of lungs, abscess of lungs, peritonitis and inflammation of mucous membrane of the stomach and intestines, liver, and spleen. The inflammation of the stomach and intestines is of a catarrhal character, sometimes moderate and sometimes severe; diarrhea with intense pain; bleeding from the kidneys; abortions by sows with pig; also abscesses in subcutaneous tissue. A hemorrhagic condition manifests itself by bleeding about the ears; inflammation of pleura with adhesions of a fibrinous character, but no effusion into the pleural cavity.

Aggregating a large number of cases in the same herd, you will find all the tissues diseased, but more particularly the lung tissues and the mucous membrane of the intestines.

I saw one case that had survived the acute attack that in two months terminated by tuberculosis and ascite; gangrene of tissues in hams and about the face; inflammation of fetlock or ankle joints, involving ligament and bone. In observing a diseased herd of several hundred head, you are impressed with the fact that the infectious poison invades all the tissues to a greater or less extent. In one hog it will be noticed

that the brain or spinal cord is the point most severely attacked; in another, the muscular and ligamentous tissues suffer; another, the bowels receive the attack, but all ending alike, with a destruction of lung tissue. The whole course of the attack very much resembles the effect produced by an epidemic of measles, and quite similar to typhus fever in man.

The first herd that I visited after receiving my appointment was Mr. J. Follet's, of Deer Park. Mr. Follet had a herd of six hundred head, large and small. They had been dying for three weeks. He had been giving kerosene and lime in their drinking-water. The herd was a mixed breed of Berkshires, Poland-Chinas; and Chester Whites. Two years ago he lost nearly his whole herd. His pasture was woodland prairie, traversed by ravines, so that every rain washed the ground, especially his feeding-ground. The water to drink was from a spring, pumped into a trough by a windmill, and the trough was so constructed that they could not get their feet into the water. This herd was well sheltered from storms and sun, and their sleeping places were scattering out-buildings, so that there was no crowding together.

I advised him to continue lime in water, and to disinfect thoroughly with carbolic acid and chloride of lime, and to give sulphur, soda, bicarbonate, and salt, which he did; also turpentine in swill. The animals soon ceased to die, and he saved nearly all of his older hogs which he had wintered over and a few of this year's pigs. One hog, whenever it found a dead pig, would at once eat into its entrails and devour the whole internal viscera. This hog thrived finely.

Joseph Watts, who had a large herd, lost a great many hogs. They had been dying for about the same length of time. I advised the same course as with Mr. Follet's, but I cannot say that any very satisfactory results followed. His herd nearly all died, and out of one hundred and fifty head he saved only thirty.

Mr. Henry Green's herd had, since May, been running on a timothy and clover pasture, through which ran a creek. They had no corn. His year-old hogs began to die first, then the breeding sows, and lastly the pigs. He disinfected very thoroughly with carbolic acid, chloride of lime, and lime. As he had a very choice lot of Poland-China hogs, he was very anxious to save them. He sold what pigs would do to go to market, but with all his care by changing lots, turning into his corn-fields, &c., he saved only four or five head.

In this herd I separated a few sick ones and placed them by themselves and gave fluid extract aconite to control the fever; but the results were unfavorable, as those thus treated finally died. A few others I gave a physic of mandrake with like results, losing all or nearly all the small pigs. I will here remark that but few of the farmers that have large herds know anywhere near how many small pigs they have, as they only count the larger hogs. Mr. Watts thinks he has lost a hundred small pigs.

Mr. Rockwood's herd is confined on an adjoining farm to Mr. Green. He also had a very choice herd of Poland China hogs, numbering one hundred and sixty-five, ninety large ones, seventy-five spring pigs. He sold twenty-two large ones after his herd was taken sick, lost thirty large animals, and has only five or six small pigs and thirty-eight large ones left. He used soda, turpentine, sulphur, and kerosene after the herd was taken sick. Fumigated once with sulphur, and regrets he did not repeat this process, as, he says, "after doing that they appeared so much more lively." I made several *post-mortem* examinations in all these herds with like results.

Talman and Ed. Libby's herds were in a woodland pasture, with

plenty of good water. Previous to turning out to pasture this spring he fed salt, sulphur, and wood-ashes combined. As soon as he discovered the herd was sick he took them from the woodland pasture and divided up the herd, placing some in a yard and some in an orchard, and others in an open field with straw stacks in it, and upon my advice gave salt, sulphur, soda, and turpentine, disinfecting with carbolic acid.

On the 6th of October I visited his herd and found he had only lost a few of his hogs, and these were mostly small pigs. He said he "never had hogs do any better than they are now doing." He continues the sulphur treatment.

Michael Ryan's herd consisted of only six shoats, which he had wintered. They were running in a pasture of timothy and clover; grass tall; clear stream of water; hedge fence for shelter. When I visited the lot I found them lying in tall grass, and all sick. His farm adjoins that of Mr. Rockwood. One half died. No treatment.

Mrs. David Strawn has a large herd, which she fed sulphur, copperas, and salt up to three months ago. She has commenced this treatment again. This herd lost heavily. The surroundings in the way of sleeping places were rather bad, being old straw stacks and dirty sheds; but they had a good pasture with plenty of spring-water for drinking. Mrs. Strawn's hogs being in very fair condition, she shipped all that were not sick. She lost most of her small pigs. Just in this neighborhood the disease appeared to be more fatal than in any other locality in this section.

John Craig Morr's herd consisted of thirty large and twenty small animals, and were confined in woodland pasture. He lost three large and six small hogs. He gave sulphur, copperas, and wood-ashes.

Isaac Reed's herd was confined in an orchard and open-lot pasture. He had five old hogs and seventeen young pigs. Once a week he gave fine soft coal, wood-ashes, and salt, with occasionally a little sulphur. He lost both large and small animals; has only two left.

John Goss had a herd of seventeen and lost twelve; the remainder had the disease, but got well. He bought seven more and put them in the pen two months after, and they did not take the disease.

Joseph Black's herd is situated just across the road south of Mr. Henry Green's. Mr. B. put sulphur and asafetida in his swill-barrel, and disinfected with chloride of lime, and saved a large number of his pigs and nearly all the older hogs, while Mr. Green lost severely, and the only difference in care and situation consisted in Mr. Black commencing treatment before his herd was taken sick. I saw no reason why Mr. Black should not have lost as many as Green or Rockwood under the same conditions.

Mr. Black's herd was in a timber and prairie pasture, cut up by ravines. He had seventy-five head, and lost five old and half his young pigs. He gave lime, sulphur, and wood-ashes.

Richard Smith, living on the south bluff of Illinois River, had seventeen hogs, a year old, and thirty young pigs. An old animal and a young pig were the first to die. The pig weighed from 75 to 100 pounds. The old animal was a sow with sucking pigs. All the pigs died, and in ten days more other pigs began to die. After he had lost four he gave one sow nitrate potash in water and she recovered. I advised asafetida, sulphur, and soda, with turpentine, in swill. After he commenced this treatment he lost no more hogs. Mr. Smith says, "Every time I give turpentine I can see that that cough gets better."

Mr. Gentlemen's herd was treated with a secret remedy by a Mr. Sutton. Mr. Sutton claimed specific treatment. He also treated some of

Mr. Watts's and E. C. Lewis's herd, but they report no particular success. Mr. Dunlavy also employed a patent-medicine man to treat some of his hogs, but he says "His medicine does not amount to a row of pins, if the government did give him a patent."

Mr. Newell's herd, at Deer Park, was treated with bi-sulphite soda, but without success. He then changed to sulphur in swill, and there was marked improvement. On October 11th Mr. Newell reported that this last treatment succeeded well. In all cases where carbolic acid has been used for disinfecting purposes, parties so using it have added some to the swill in trough. One litter of pigs which I treated entirely with carbolic acid passed the acute attack, but finally wasted away and died. On *post mortem* examination I could not discern any immediate cause of death.

Cornelius Sullivan, living in the outskirts of the city of Ottawa, had three large and six small pigs taken with the disease. At the time I saw the lot he had lost two large and one small one. I gave him bromide ammonium, but have not yet heard how it acted after the second day of administration. He said then that he could see no difference. I gave the same remedy to Mr. Thomas Toombs and a Mr. John Hickey, but have not yet received any report from them.

Mr. Hunt tried a remedy administered by Dr. Dunlap, of Iowa. At last accounts they were still dying, but he says he thinks it helped them some.

Many have used tar as a preventive quite freely with more or less apparent advantage. While nothing gives entire immunity, yet herds in which this disinfectant has been used do not suffer so severely as others not so treated.

Abner Strawn had a very fine herd of Berkshires. He is largely engaged in raising fine stock, and is fitted up with every convenience for feeding and sheltering it. Still he lost very heavily. The widow Hardy directly west of him lost all but one or two of her hogs, but in the next herd west of widow Hardy's, owned by Mr. Duffy, which was only separated by a common board fence, not one died. He fed sulphur mixed in swill. This was in the summer of 1877. This year the disease is not in that locality, and what few animals Mr. Strawn had left have done well, and he has raised some very fine pigs from a sow and boar that had the disease last year. A Mr. Degan has also raised a fine litter of pigs from a sow and boar that came very near dying last year. I have seen several instances where those that had passed through the disease and were used for breeding purposes have done well. I met with one case, that of Mr. Goss, who says that he did not succeed in raising pigs from parents that had been affected, but the cause may have been in the boar, as he made no further test.

Peter Donlavy, situated north of the Illinois River, imported five sows and introduced them into his herd the latter part of August. He purchased of a Mr. Poundstone, whose herd it has since been proven was infected at the time, as they subsequently died. As Mr. Donlavy was situated in a neighborhood where there was no disease pending, I desired to make an effort to quarantine the disease and confine it to his herd. Now, at the present writing (October 8th) it has not spread to any adjoining farms. His nearest neighbor is eighty rods away. Mr. D. has disinfected thoroughly and continuously with a solution of crude carbolic acid, a tea-cupful to a pail of water, using a sprinkling pot to sprinkle his hogs and yards, sleeping and feeding places.

If it can be established that the disease can be quarantined, then I think we have made a move in the only direction with which I have any

knowledge by which we can prevent its spread, unless the government will do as England did with the cattle plague, kill every infected hog and pay the owners a part of the loss, and thus stamp it out. Certain it is that some stringent measure should be used to prevent transporting diseased animals. As long as railroads are allowed to ship, or owners to sell, diseased animals, just so long will we have the disease spreading over the country. The loss, starting from one contaminated spot in this country by transportation by rail of diseased hogs, has cost this country this year already not less than seventy-five to one hundred thousand dollars. Some place the figures much higher. The loss is not only to the owners immediately, but in the future. When it shall become universally known that diseased animals are being continually slaughtered and packed for shipment, when Europe shall learn that we are sending them cholera hog-meat to eat, then one of the greatest sources of revenue to this country will be seriously damaged. It is a notorious fact that the stock-yards in Chicago are full of diseased animals. Commission men say that they are selling that class of hogs for slaughtering and packing, and think nothing of it. I know that in the yards in this town hogs die from this disease, and as well hogs are put into the yards preparatory for shipment, they will, of necessity, contract the malady. They are sent to market, and about the time they should be slaughtered are taken sick. I know this is not a very pleasant picture for those that like a steak of ham with eggs, but it is a true one, and when Congress can only appropriate the paltry sum of ten thousand dollars to aid in trying to stop this annual loss of twenty or thirty millions of dollars' worth of property, I want every Congressman to just reflect that almost everything he eats has a little lard in it, and that every time he calls for ham he may be eating a piece of cholera hog. I do not feel competent to present this subject in the light it ought and deserves to be presented. If we wish to preserve this industry the matter must be grappled with vigorously and with no stinted hand, and prosecuted until the last vestige of this disease is swept from this country.

I have used by way of experiment nearly all the articles recommended in your circular, but the time of observation is so limited I cannot yet report results that would be of any practical information to the government. Owners of hogs were willing to pay the expense of medicines themselves, and I have to thank those gentlemen who have kindly and earnestly seconded my efforts to arrest the disease, and at the same time try to obtain information in regard to this terrible scourge. In summing up I do not deem it necessary to give a history of each individual herd that I have seen, as those mentioned are types of them all.

As to treatment, I am led to the conclusion that the use of disinfectants offers the best field for success. The use of turpentine for the cough acts better than anything I have tried, and when given early, I think, very much mitigates the severity of the disease. A mild laxative like sulphur also acts well; besides, it has the additional advantage of being destructive to low forms of organisms. Alkalies during the attack are certainly beneficial. Frequent changing of the location of the herd and stamping out every sick pig will, in the end, save money to the owners.

I hope, now a beginning has been made, that Congressmen will see the importance and real necessity of following up this small beginning until it is thoroughly ascertained what must be done. If it proves, like most contagious diseases, largely uncontrollable after the animal has once been attacked, and must have its own run, then we must turn our attention to eradicating the plague by more expensive and radical means.

Such legislation in regard to transporting diseased animals, or the

sale of them by owners, or the killing of all animals that have been exposed to the disease, must be enacted as will effectually put a stop to the spread of it over this country.

I am, very respectfully, your obedient servant,

REUBEN F. DYER, M. D.

OTTAWA, ILL., October 1, 1878.

REPORT OF DR. ALBAN S. PAYNE.

Hon. WM. G. LE DUC,
Commissioner of Agriculture:

SIR: My description of this disease (so-called hog-cholera) will be confined to its history as it invaded that beautiful section of country lying between the Blue Ridge and the Catoctin chain of mountains, in Virginia, during the summers of 1869-'77-'78.

GENERAL CONSIDERATIONS ON CONTAGION.

Before speaking of the endemic and epidemic disease under consideration, generally known as hog-cholera, although a palpable misnomer, I will offer a few remarks upon the subject of contagion. This is always a question of paramount importance, not only to the investigator of diseases, but to the people at large. One great difficulty in arriving at a definite conclusion as to the contagion or non-contagion of a disease, I am persuaded, arises from the too great latitude given to the definition of the word *contagion* by the older and more systematic writers. In the sense in which this term is used at the present time it strikes my mind as being too vague and indefinite. The same objection may be urged against the term *infection*. For if you mean to signify by the term contagion a disease that transmits disease from one subject to another by direct contact, without the assistance of any susceptibility or predisposing cause on the part of the patient, I should then contend that very few epidemic or endemic diseases were so, strictly speaking. But if you mean by contagion to signify a disease from which exhalations or emanations may arise during its progress, capable of exciting a similar disease in those exposed to the influence of the noxious exhalations, or rather deoxygenizing emanations, then I will say that most of these epidemic and endemic diseases to which man and the domesticated animals are equally liable are more or less contagious. For here you have an exciting cause furnished by a foul deoxygenized atmosphere and a predisposing cause furnished by a weakened, impoverished system from improper food, bad water, or from the want of proper protection from inclement weather, or from sudden climatic alternations, causes sufficient of themselves, under certain circumstances (which we call epidemic influences), to produce disease in man or domestic animals. Infection is as unfortunate and indefinite a term; nor are the terms "specific" contagion and "contingent" contagion, as defined at the present day, by any means explicit. In my humble opinion fevers are a unit, varied in their character by surrounding circumstances; that is, in a temperate climate a remittent bilious fever becomes yellow fever in a hot climate when the temperature of the atmosphere is at its acme of power. The theories of ozone, "disease germs," micrococci, &c., are very plausible in theory, but they have yet to be proven.

Contagious diseases are produced either by a virus capable of causing them by inoculation, as in small-pox, or by miasma proceeding from the sick, as in the plague, measles, and scarlet fever. No two physicians agree as to which diseases are contagious and which are not. The contagia of the plague and typhus, especially the latter, is denied by many. It seems probable that a disease may be contagious under certain circumstances and not so under others. That is, a case of ephemeral fever, fever of acclimation, the mildest form of fever known to the medical profession, arising from cold superinduced by sudden and decided climatic alternations, may, if the patient is kept in a close, foul condition, be converted into a disease capable of producing emanations which will reproduce a similar disease in those exposed to them, and with great virulence. Ephemeral or camp fever is almost sure to manifest itself in cases where large bodies of healthy men are brought into camp from different sections of the country. This is equally apt to be the case when you bring together healthy young animals from different parts of a country, even if from different parts of the same county. We know this much; but how much this *materia morbi* weighs, what its color is, how it smells, are to us secrets yet hidden from our view. We know that if a man has fever and it intermits he becomes cold and shakes; we say he has "intermittent fever," "chills and fever," "ague and fever," and we know if he has a long continuance of this kind of fever, one of the organs of his system (the spleen) is apt to become enlarged, and this is about all we really do know as yet, because no one has seen, weighed, or smelled the peculiar miasma which causes intermittent fever.

I noticed two facts which threw important light upon this subject of hog-cholera in this Piedmont country, viz., that recently the larger portion of the sick hogs were under twelve months of age (shoats), and the larger portion of them were taken sick while eating the corn after cattle which were being fattened for market. The popular name given this disease is, as I have before said, a palpable misnomer. If I am correct in my diagnosis—and I think I am—it is *Rotheln*, or Dutch measles, and should be classed with the exanthemata, along with erythema, erysipelas, rubecula (measles), roseola, scarlatina, nettle-rash, and the artificial exanthemata. The young hogs being mostly the ones affected, strengthens the hypothesis of its being an eruptive fever. As far back as 1852 I recorded the fact that I considered epidemic tonsillitis (*Rotheln*) as the most frequent epidemic disease to which Piedmont, Va., was liable, and that this arose from the moist and variable character of the climate. I have since seen nothing to make me change this opinion, but much to strengthen and confirm me in this theory. Horses, hogs, cattle, and sheep are as susceptible to disease from exposure to cold, rainy weather, and to sudden climatic alternations, as the human family; probably more so. They suffer from exposure to cold as easily, and are as much given to catarrh or cold as the human race.

A disease peculiarly liable to be felt by the young of both the human and animal race, yet no age, sex, or color affords any certain protection from this epidemic disease, called *Rotheln*, or German measles. In my opinion, then, this so-called cholera is no cholera at all—has not a single choleric symptom, as the bowels are invariably constipated until moved by medicines, or give way under the last throes of speedy dissolution; but that it is rather a fever prevailing in an endemic and epidemic form, subject to all the natural laws governing fevers, from its inception to its termination, in restoration or in death, and more closely resembling scarlatina and scarlet fever than any other of the varieties of the anginose

exanthemata, and is now known to some of the medical profession as Rotheln, or German measles.

I will now proceed to give you a short history of the so-called hog-cholera as it appeared in that section of country known as Piedmont, Virginia, during the fall of 1877 and during the spring of 1878. In the fall of 1877 hog-cholera, so called, made its appearance in that section of country lying south and east of the Bull Run Mountains, and the losses by death reached an aggregate of 85 per cent., mostly young animals, as I learned from Messrs. John and Ludwell Hutchison, intelligent farmers living near the old Braddock road, four miles below the village of Aldie. The people were much divided in opinion, some believing the improved stock of hogs most liable to the disease, others that they proved to be more exempt from its fearful ravages. The care which a farmer took with his hogs, I presume, had more to do with lessening the bill of mortality than the difference in breeds. Hogs feeding after cattle, and young hogs, were generally the first to show symptoms of the disease. No remedy so far as they knew seemed to be of any benefit. Dr. Ewell recommended calomel, and some persons thought it of service. So far as I could learn no case occurred north or west of Catoctin Mountains until October of 1877. The section of country where it occurred as early as February, 1877, is at an average altitude of 400 feet above tide-water. On the 13th day of October, 1877, J. Milton McVeigh first noticed that one of his hogs, feeding after his fat cattle, appeared stupid, dull, droopy, mopy. He very soon noticed others appearing to be affected in the same way. This farm is located just above the little village of Aldie (the William Berkley farm), at an average altitude of 550 feet above tide-water. He had on his farm at this time fifteen home-raised hogs, but having some large cattle that he thought would justify him in corn-feeding he determined to purchase some hogs to follow after the cattle and eat up the waste corn. Accordingly he bought, about the 1st of August, 1878, of Mr. Cox twenty-two fine, healthy shoats, of Mr. C. B. Rogers twenty healthy shoats, and of Jack Simpson ten more. These fifty-two animals were turned into a field to run after his cattle. The field was high and dry, rolling, and at an altitude of 600 feet above tide-water. The hogs had good, comfortable, dry, warm shelter to go to, and in the field there was an abundance of fresh running water from a large, fine mountain-spring. About the middle of November the disease commenced in earnest, first with shoats purchased of Mr. Cox, then with those bought of Mr. Rogers, and lastly with those procured from Mr. Simpson. He lost fifteen head between the middle of November and the 1st of December. One or two would be taken at a time and die, and about the time he would flatter himself that the disease had subsided, one or two more would be taken. This continued until the 1st of February, 1878, and during this time he lost thirty-nine out of the fifty-two shoats. After this, no other cases occurred. None of his *home-raised* hogs took the disease until he had sold his cattle and disposed of the remaining shoats, when, supposing the disease killed out by frosts and the cold weather, he turned a fine large sow and eleven pigs into this field where the sick shoats had run. The sow escaped the disease, but the pigs soon became sick, and he lost seven out of eleven of them. About the 1st of January following, the remainder of these shoats having become fat, and being apparently healthy, he killed five, and after dressing them he found the skin purplish, red to pale black; little pustules or pimples covered the shoulders, and by pressure pus would spin out. The throat gave unmistakable evidence of disease, and the lungs were in a condition of decay. The lower bowels were full of black, hard, dry balls (*scybalæ*) the color

of tar, and very dry and hard. These animals had never been in the barn-yard, and there were no marshy places in the field in which they ranged. This history, as it occurred on Mr. McVeigh's place, militates strongly towards the theory of ephemeral fever (fever of acclimation) as the exciting cause. The weather was rainy, warm, alternating with damp, raw, chilly weather. The hogs of his neighbors, John Carl, William Tiffany, and Samuel Simpson, living in a southeasterly direction, were dying at the same time. They gave signs of great thirst, would eat mud and soft soap avariciously. As a general thing they had a cough, and occasionally vomiting; appearance of eye not noticed. E. C. Brown's hogs, of Middleburg, began to show signs of disease; would mope about and look dull and stupid. About the 20th of June, 1878, all his hogs had a cough; bowels very much constipated; discharges from calomel sticky and tarry, black as tar itself; great thirst; would eat mud, soft soap, and their own excrements. All had more or less eruption upon the skin; skin had scarlet blush. Hogs had plenty of good feed, grass, grain, slop. He tried every remedy, almost everything; thought calomel the only thing of service that was tried; lost about 50 per cent. of his hogs. Shoats proved to be most liable to the disease. The hogs of Mr. A. B. Moore, proprietor of Aldie Mills, commenced to show symptoms of disease about the middle of June, 1878. The disease was not as fatal with his hogs as it generally was with those of his neighbors. Attributed this fact to good clean shelters, good food, mill-feed, apples, and slop. Gave no medicines. Altitude of his place 400 feet above tide-water. About this time, advancing from the northeast and traveling south (in direction of prevailing winds and fog), it began to be felt at all the farm-houses along the road leading from Middleburg, in Loudoun county, to Salem, in Fauquier county, playing sad havoc with the young hogs of A. B. Rector, Mr. Hathaway, John Middleton, Howell Brothers, Maj. T. B. Hutchison, &c. Mr. A. B. Rector thought the plant known in some neighborhoods as barrow-root, in others as burvine, in strong infusion, was beneficial. This region of country is mostly 600 feet above tide-water. Here also the hogs running after cattle were those most affected. About this time the disease passed up the pike leading from Aldie to Upperville and Paris, never halting until it reached near to the summit of the Blue Ridge, above the village of Paris, in Fauquier county, at an altitude of 1,100 feet above tide-water. From Salem it passed up the main road, leading from Salem to Markham, Mr. T. A. Rector's hogs being among the first affected. His nearest neighbor, Mr. Wilford Utterback, living between Mr. Rector and Salem, was unusually fortunate with his hogs. He did not lose many; thinks they need good attention; knows of no remedy. Altitude of Mr. Rector's and Mr. Utterback's farms, 550 feet above tide-water. F. W. Maddox, proprietor of Oak Hill farm, lost about one hundred hogs. Mr. Charles Brown lost all he had, except five shoats. The disease was very fatal at Maj. S. B. Barley's farm, near Delaplane Station. At A. J. Chunn's, John R. Strother's and others, on the west side of the Little Cobbler Mountain, the disease was very fatal. These farms all lie at an average altitude of 600 feet above tide-water. No remedy seemed of any avail in stopping its ravages on any of these farms. Above Markham, at Mr. George Strother's, Mr. Conner's, and Mr. Charles Trussel's, the disease was quite fatal. At Mrs. Palmer's, above Petersburg, at an altitude of 1,150 feet, it prevailed with violence. The altitude at Mr. Strother's, Mr. Trussel's, and Mr. A. Conner's is about 550 feet above tide-water. Mr. Trussel's hogs were fed upon mill-stuff, corn, and slop. He lost sixteen out of twenty. Mr. A. Conner lost eighteen head out of twenty. Young hogs were the ones that suffered most. Mr. Charles Trussel

thought his hogs had some kind of a fever. He tried no remedies. I think I can safely set down the loss by disease this season in hogs in this rich productive country at 75 per cent. In my travels through this section of the State I saw many hogs, partially recovered, but still in a low state of health, that had lost their hair and their hoofs. The tegumentary tissue (skin) looked as if it came off in fine bran patches, instead of coming off in large flakes. This I considered unmistakable evidence of tegumentary excitement. The internal mucous membrane being a continuation of the external tegumentary tissue (skin), we may reasonably expect to find the internal mucous membrane likewise in a state of phlegmhymentitis. Add to this symptom the significant fact of such great thirst, and we raise a strong presumption that the disease is a fever, and one of the eruptive fevers, beyond peradventure. The instinct of the hog tells him what is cooling to him, therefore you find him eating mud, soft soap, his own excrements, rotten wood, ashes, and the like. I met no intelligent man who did not believe that either the hog's lungs or his throat were affected.

Mrs. Simpson's hogs, running in the common just below the village of Aldie, within fifty yards of Ish's tan-yard, were among the first to take the disease. Ish's hogs ran regularly in the common, yet none of them took the disease, while almost every one of Mrs. Simpson's hogs died. Ish gave his hogs chamber-lye in their slop. Mrs. Simpson did not use this remedy with her hogs. J. Milton McVeigh tried the same remedy, but without apparent effect. B. F. Carter, sr., gave his hogs coal-oil, and lost none. B. F. Carter, jr., gave his hogs the oil in same quantity and lost all. D. Mount and Daniel Lee used asafetida one year, with supposed good effect; another year it had no effect at all. Thomas A. Rector gave his hogs soap-suds and soda in their slop one year, according to advice of the writer, with marked success; persuaded by others to give turpentine and sulphur in the present epidemic, his loss was large. I found many persons who had come to the conclusion that during some period of the disease the hog's throat was sore, and that the disease was the putrid sore throat, which was so fatal to swine some forty years ago in this Piedmont region of Virginia. I find most of them agree that there is swelling about the face and eyes, eruption on the skin, great thirst, often cough, occasional vomiting, constipated bowels, a thumping in the side or sides, lower bowels full of hard, dry balls of fecal matter, with a rapid loss of flesh. Other farmers seem to notice sequelæ of the disease more, and speak of swelling of the fore-legs; that they shed their hair and hoofs; skin peels off, and new skin becomes scurfy.

I gave for publication a short history of the so-called hog-cholera as it prevailed in this section of Virginia in 1868 or 1869. I have no notes left, and I am not morally certain in which year the disease prevailed. I remember, however, to have remarked that the first indication of sickness in the hog noticed by me was closing the eye in the bright sunshine of morning. Now, this symptom may have been from swelling of the face, but I then attributed it to contraction of the pupil of the eye and from intolerance of light. The next one had a ticking in the side, and then a rapid loss of flesh, so much so that a large fat hog would become so thin in a few days that you could almost read a newspaper through him. I will remark that the only symptom at all like cholera is this rapid loss of flesh. But then there is no purging, no loss of fluid by urination, but it seems rather that the heat in the internal organs of the hog is so intense that all the fluids in his system are dried up. To satisfy myself on this point I placed them in pens, with clean, dry plank for flooring, overnight, and in the morning the large hogs would be

almost living skeletons; but you never could discern any urinary or other discharges on the clean dry floor of their pens. I made some *post-mortem* examinations, and generally found inflammation in various stages in the posterior portion of the lungs, and the glands and throat in a gangrenous condition—blood thick and black as tar and disinclined to flow; indeed, in some cases it was black, hard, and as dry as a chip. Any one who carefully reads the reports of the Department of Agriculture for 1877 will perceive that some of the writers describe the disease as attended by a fever; others, again, speak of the peculiar eruption attending it. Now, I submit that if there is a fever accompanying hog-cholera, and an eruption also, it is *prima facie* evidence that it is a disease which rightfully belongs to that class of maladies known as eruptive fevers, and it only remains for us to establish to which species of the exanthemata it belongs for us to place its treatment on solid and well-established grounds.

The description I gave in 1872 and the account given by Dr. Gillespie in 1877, goes very far to identify *rotheln* with the hog disease that prevailed in Piedmont region of Virginia in 1877-'78. Fortunately the remedy I shall recommend as a preventive, as well as a curative, agent during its prevalence is equally beneficial in scarlet fever, diphtheria, and erysipelas in some forms. It is a trite saying but a true one that an ounce of *prevention* is worth a pound of *cure*. If this is true in regard to diseases in the human family, it becomes eminently more so in the diseases incident to domestic animals.

Etiology.—The causes of disease are, unfortunately, frequently obscure, although they are sometimes evident enough. The causes of disease resolve into several varieties. As writers divide them differently, a short explanation may not be out of place. As a general thing the predisposing and occasional causes are the only ones on which much stress is laid by medical writers. Causes accessory are those which have only a secondary influence in the production of disease, as the want of proper shelter for domestic animals in inclement weather may be indirectly the means of producing disease among them. Accidental causes are those which act only on certain given conditions and which do not always produce the same disease. Cold may be an accidental cause of acute pneumonia, inflammatory rheumatism, &c. Proximate cause is the disease itself; superabundance of blood is the cause of plethora, &c.; external causes are such as act externally to the patient, as cold, &c.; these causes are such as determine the form of the disease; internal causes are those which arise within the body; mechanical causes are those which act mechanically upon the windpipe in producing suffocation; negative causes comprise all those things the privation of which may derange the functions, as want of food, water, &c. They are opposed to positive causes which of themselves directly induce disease, as the use of crude, rotten, indigestible food, &c; occasional or exciting causes (actual causes) are those which immediately produce the disease. Occult, hidden, or obscure causes, any causes with which we are unacquainted; also certain inappreciable conditions of the atmosphere—if I may use such a word, "distemperature"—which we believe gives rise to endemic and epidemic diseases. Physiological causes are those which act only on living matter, as narcotics; predisposing or remote causes are those which render the body liable to disease, as previous low, depressed condition of system, bad health, &c.; principal causes are those which exert the chief influence in the production of disease as distinguished from the accessory causes; specific or asserted causes are those which always produce a determinate disease, contagia, for example.

The deaths, in many instances, in this hog-disease arose from a mechanical cause. Throwing him down on his back to "drench him" with some remedy produced suffocation, the wind-pipe or the swollen tonsils were tilted back by pressure upon the epiglottis, and the glottis being thus mechanically closed no air could penetrate the lungs, and the result was death. When drenching is resorted to, the animal should be made to stand up on its hind feet, and sudden deaths will not so often occur from the administration of such remedies. The treatment of *rotheln* and epidemic diseases generally resolves itself into prophylactic (preventive) and curative. Among the most valuable remedial agents to prevent epidemic diseases among domestic animals, especially the hog, may be enumerated a good, clean, dry bed of leaves or straw often renewed, protected by a good shelter and with a plank floor; a good supply of pure running water to drink; plenty of good, strong, generous food, made up of corn, buckwheat, or oats, vegetables, fruits, and slop. Give them regularly a little dry salt, all the "soapsuds" you can, and let them have a bank of hickory ashes to run to. By this means the hog would be better able to withstand the sudden climatic alternations of from heat to cold, for these climatic alternations are, in my opinion, the most prolific source of all epidemic diseases to which the human race as well as domestic animals are liable. It is an admitted fact, I believe, that domestic animals, in fact all animals, breathe more through the pores of the skin than the human family do. By this the internal organs are relieved of a considerable burden. Hence arises the importance of keeping the pores of the skin open and in a healthy working condition. To effectually do this you must provide your hogs with frequent new beds; burn up the old ones, which, when worn down to dust, become moistened and the whole tegumentary tissue of the hog is agglutinated, as it were, by a paste-like substance, and is rendered totally unfit to perform the functions necessary in the animal economy. We can see why this should strongly predispose to disease. To further prevent this undesirable condition of the hog's skin, I would recommend washing with strong soapsuds and then scrubbing them dry with a clean corn-cob until their skin presented a red, healthy glow. See that the pores in the fore legs are open (*the little safety-valves*); give them plenty of chlorate of potash of the strength of two drams to a pint of water, and the chances of disease will be greatly lessened. Timothy, orchard, and other grasses incline them to constipation, which cannot be relieved except by the strongest remedial agents. Green plantain and purslane are good for hogs.

For a long time a great many German physicians, and a number of the profession in our own country to-day, believe that the extract of belladonna (deadly nightshade) given beforehand will prevent children from catching scarlet fever. Now, as *rotheln* is a kindred eruptive fever, might not some herb be found that would prove a preventive in this disease? I am more inclined to recommend *Veratrum viride* (American hellebore) as a prophylactic in this disease, because I am satisfied that venesection (bleeding) in the early stages of the malady is demanded. I remember that all hogs not castrated, and those castrated early in the disease of 1868 or 1869, recovered, and not only recovered, but had good recoveries. So did all the hogs I saw in those years early enough to get blood from them. After the first and second stage of the disease in those years the blood was very dark, black, thick, and could not be made to flow. From this condition of the blood, and from the low temperature I found in many hogs, I suspected congestive chills, or more probably dumb chills, of a very severe character. I am still disposed to cling to this opinion. In all those cases where the hog is mopy and

chilly looking, I would, after the first stage of lowering the pulse has passed, recommend a teacupful of a strong infusion of the leaves of dogwood or the same quantity of a strong cold infusion of boneset. In either case add a teaspoonful of powdered ginger or thirty drops of the oil of black pepper, to be given morning, noon, and night regularly. Chlorate of potash, two drams to a pint of water, for drink at will.

I think the hog is peculiarly susceptible to the influence of malaria, therefore they had better be kept in the woods, or in a pen, or on high and dry places where there is not much grass, and fed on corn, oats, and buckwheat, with a proportionate admixture of fruits, vegetables, and slops. Soapsuds, all the preparations of potash, hickory ashes, soda, saleratus, &c., are anti-febrile, and will be found very beneficial when given in slops. In my opinion the throat and the adjacent parts, the upper and the posterior portions of the lungs, are the only really vulnerable portions in the animal economy of the hog. Protect these and you thereby protect the whole hog. I have no doubt that in one epidemic in this hog disease you may have it so dressed in the livery of pneumonia that the most accurate observer might diagnose the disease to be primarily pneumonia. In another case you may have an exudation of membrane, thereby simulating very closely diphtheria. Again, you may have *rotheln*, but the disease spreading to the parenchymatus portion of the lung and on to the pleura, producing *rotheln* complicated with pleuro-pneumonia, and so on. To show that the stomach of the hog is not very susceptible to the action of poison, I will state a fact known to almost every one in this region of country, that the hog can feed sumptuously on the rattlesnake, moccasin, and the poisonous copperhead with perfect impunity. Again, unless the snake bites the hog about the throat, and on the jugular vein and carotid artery, there is no harm done, but if over either of these blood-vessels the bite is speedily fatal. The internal remedy upon which I most rely, both as a preventive and curative agent, is that invaluable remedial agent, chlorate of potash. Dr. L. P. Dodge, in Georgia Medical Companion, December number, 1872, page 717, says:

The therapeutical effects of this agent are obtained by direct application and by absorption. When taken into the stomach it imparts a cooling sensation to the mouth and throat; the circulation is somewhat depressed. Hence it has been classed by authors as refrigerant, and from increased action of kidneys diuretic. By some it has been supposed to exert hepatic action. Without doubt it does, but to what extent we are not prepared to state. When applied locally to ulcerated surfaces of the mucous membrane, as in ulcerated stomatitis and many other diseases of the mucous membrane, and also to ulcers of the integuments, it has a stimulating action, as shown by increased sensation of the parts and excited vascular action, which becomes alterative, and, therefore, salutary. Its most decided effects are obtained when taken into the system. Chlorate of potash, we think, has a specific action on the mucous membrane—the glandular and cutaneous systems. In scarlatina it is universally recognized as the best remedy. In diseases of the mouth and throat, whether ulcerative or inflammatory, chlorate of potash has a salutary effect. In diphtheria it is one of the most reliable remedies for lesions of the throat. In no disease is its alterative action better shown. Given to an adult in tablespoonful doses of the saturated solution every hour for twenty-four hours, and there will be a marked change in the general appearance of the diseased parts. The exudation will be diminished, the fever removed, the surface paler, the swelling diminished, the vascular action less, the sensation ameliorated; the skin becomes cool, the pulse less frequent; in fact, a large per cent. of the incipient form of diphtheria requires no other remedy.

You can, then, safely give the hog one good dose of calomel in this disease, and then rely with an abiding confidence on the chlorate of potash.

Respectfully submitted.

ALBAN S. PAYNE, M. D.

MARKHAM, VA., November 25, 1878.

REPORT OF DR. J. N. McNUTT.

Hon. WM. G. LE DUC,
Commissioner of Agriculture:

SIR: I have the honor to report that, in obedience to instructions from your department, I have devoted the past two months to the investigation of diseases of swine. Though my labor has been confined to one county (Jefferson), I had abundance of material, and have examined several hundred diseased hogs, and made thirty *post mortem* examinations.

While the results of my experiments and examinations may not be as satisfactory as could be wished, I am convinced, first, of the nature of the disease, and, secondly, that if it cannot be cured in all cases, it can by proper hygienic measures be with much certainty prevented.

I have aimed to have the results of my examinations as practical as possible, and will endeavor to present them devoid of any scientific theories.

The disease has, in this county, as in other portions of the State, prevailed in different localities for a number of years. It usually begins in early spring, and increases in extent and severity until the late summer and fall months, disappearing toward the approach of winter, only to appear in another locality with the return of spring. Although in different seasons and localities it presents different symptoms, it is evidently the same fatal enemy to the pig raiser, only in another garb. Unfortunately, as the name of a disease should convey some idea of its nature, this dreaded scourge is called "hog-cholera," why we know not, unless from its rapid and almost certain fatality.

While the pathological conditions found in my examinations were many and varied, yet the main lesions pointed to the intestinal mucous membrane and lungs, with sufficient uniformity to clearly indicate the nature of the disease; and as it is clearly shown that the disease, while contagious, is not communicable to other animals nor to man, it is evidently a specific contagious disease *sui generis*—typhoid fever of swine. The disease occasionally begins suddenly with symptoms of a chill, the pig standing drawn up and shivering on the sunny side of a barn or fence. But the disease generally begins more insidiously, and the first thing noticed is, in a previously healthy pig, a dull appearance with a wrinkled, drawn look about the head and neck. It stands with back humped, head and shoulders drooping, eyes listless and watery; loss of appetite, or perhaps eats for a few moments and then stands over its food with an appearance of loathing; sometimes it shows a disposition to nausea, great and constant thirst, increased temperature, first about breast and belly, and after one or two days extending over body and limbs. Fever at first of a remittent character; temperature in rectum 102°–104° F., in morning; in the evening rises to 106°–109° F. Has hacking cough, which is increased on exertion; sometimes attended with frothy (white or yellowish) and in last stage offensive discharge from the nose. Breathing rapid and labored, with drawing in of the flanks; panting. Bowels usually, at first, constipated; in some continue so; in others become lax after a few days, to be frequently followed, especially in protracted cases, by very dark fetid diarrhea. Kidneys usually act well, though urine is generally scanty and high colored. In very malignant cases it is suppressed. As the disease progresses the patient shows a disposition to get away from the herd; lies on its belly under straw, brush, or any place for a shade; is stirred up with difficulty; walks with

a staggering, painful gait. Some, if they attempt to run, go sidewise, and carry their head to one side. In white hogs, rose-colored spots appear on belly and inside of arms and breast, effaceable by pressure, but return immediately. On dark hogs, the spots are of a petechia or hemorrhagic character, with elevation of the cuticle, especially behind the shoulders and on the neck and back of the ears. In one case, sick three weeks, I found sloughs one inch or more in diameter, thickly scattered over belly, neck, and snout. Large abscesses are occasionally seen in parotid glands (behind the ears), and in a few malignant cases the legs swell until the skin bursts, discharging a thick, yellow serum. In some cases the hoofs fall off. If the case does not end fatally, as it often does in a few days, the symptoms increase in severity. The animals rapidly lose flesh, get lousy, refuse to eat or take note of their surroundings; if possible to arouse them, they immediately relapse into a stupor. Some pass off in this way; in others, convulsions close the scene. When one occasionally gets well, it is after a very protracted convalescence. Abscesses, ulcers, &c., form on different parts of the body. The hair all falls off, and it seldom makes much hog anyway.

My subjects for *post mortem* examinations were taken, some of them a few hours after death, and others were killed during various stages of the disease, from the first day to the third, and in the fourth week, by bleeding. The subjects that had died were usually very much emaciated, lousy, offensive; snout and ears a dark purple; eyes shrunken, sometimes ulcerated, and body covered with dark spots of extravasated blood.

The principal lesions found were in the alimentary mucous membrane and in the organs of the chest. The tongue I seldom found coated, though usually red and often ulcerated, especially towards the base, extending into throat and down the oesophagus. The stomach was usually found distended with undigested acid, and sometimes offensive ingesta and flatus. The ileum (small bowel) and colon (large bowel) filled with hard dry feces or with dark liquid, fetid discharges, and distended with gas. The mucous membrane of stomach and intestines, differing with the stage of the disease at which death had occurred, presented the various stages of inflammation and its sequela, from a faint pink blush to a dark red thickened condition. This was the case with the whole surface of the stomach and of the ileum or colon, or more or less extensive portions of each. In some cases the dark thickened membrane could be easily stripped from the sub-mucous coat. Ulcers in the glands of the small intestine and caecum were frequent. Peyer's glands in two or three cases were very much enlarged and thickened, and covered with hard, dark scabs. In several cases the ileum was so contracted in several places that they looked as if they had been scorched.

The peritoneum was generally more or less inflamed, and in two cases I found in one two and in the other four quarts of straw-colored serum in the abdominal cavity; a portion of which, in the largest, was coagulated, apparently by the great heat of the bowels. (The temperature was 109° F.)

The lungs I found, with two exceptions, in different degrees of inflammation, varying with the period of the disease, which constitute pneumonia. This was the case either in the first stage (that of congestion), the second stage, (no hepatization), or third stage (gray hepatization); though, as is usual in diseases of a low and feeble character, these stages were not always well marked, but often presented more the condition called splenization, caused by the blood not yielding sufficient plastic matter to form the firm, resisting character of hepatization.

The amount of lung involved, of course, varies in each case; in some one lobe, usually the upper if the left lung, and lower if the right; in others, again, all of one lung, and in one case I found the whole of both lungs involved, the left in the third and right in the second stage. In young pigs I found what is known as lobular pneumonia, that is, diseased lobules, of which each lobe is composed, were mixed indiscriminately with healthy lobules, giving this lung a mottled appearance. In one case I found the disease in the upper lobe of the right lung. The inflammation was confined to the air vesicles, and constituted "vesicular pneumonia." In this case I found tubercles scattered through the diseased lung, and in one the upper lobe of the left lung was one mass of tubercles. All of the cases were complicated, to a greater or less extent, either with inflammation of the pleura (the covering of the lung), or of the bronchi (air-passages). In some cases the bronchial tubes were inflamed and filled with a frothy and occasionally a bloody mucus, in others ulcerated and secreting a yellow, offensive pus; the ulceration often extending into the larynx, and even into the nasal passages. In six or eight cases the pleura, especially the right, presented more or less extensive patches of inflammation, with adhesions between the pulmonary and the costal portions, that is, between the portion of the pleura and that lining the chest.

The heart was, in protracted cases, pale and soft, and in one case inflammation of the pericardium (covering of the heart) with effusion into the pericardial sack was observed.

The liver was, in most cases, more or less congested, and in one case very much enlarged and filled with patches of inflammation. The gall-bladder was usually filled, sometimes distended, with dark-green, thick bile.

The pleura was in all cases enlarged, and in one case very dark, almost black, and so friable that it would not sustain its own weight. The kidneys were usually pale and sometimes soft, and in the two cases where there was so much cedema of the lungs and suppression of the urine; the malpighian bodies were of a dark-red color, and the lining of the pelvis (inside of kidney) was very much inflamed and covered with extravasated blood.

With a few exceptions the mesenteric, inguinal, and other lymphatic glands, especially bronchial and cervical, were in various stages of inflammation and enlargement, and in some cases of a peculiar dark-red color.

The brain proper and the spinal cord I found usually in a normal condition. In one case there was effusion into the ventricles. The meninges of the brain and spine were, in protracted cases, congested or inflamed, and in two cases the dura mater (lining of the skull) was thickened and easily separated from the skull.

The cause of the disease has been variously ascribed to feeding, crowding, overdriving, filthy pens, ringing, &c. From information obtained from hog-raisers, from our own observation, and reasoning from analogy, I am satisfied that the real cause of the disease is the present manner of breeding, raising, and feeding the pigs, and as a result of my observation and treatment I found the same remedies as used in remittents in the human subject as the most effectual. I am satisfied that the disease is at least developed by malaria, and relieved, if at all, by the same treatment as malarial diseases in man. Instead of raising pigs from a sow eight or ten months old, and cramming them with slops and dry corn in order to make three-hundred-pound porkers of them in twelve months, select good healthy sows from eighteen to twenty-four months

old; allow them to have but one litter each year; let the pigs grow up naturally; feed them but little, and give them no dry corn; let them have plenty of water and clay to drink and bathe in, and give them a chance to root for a living, and to that end furnish them good pasturage on soft, moist, and, if possible, shady soil, where various roots are plenty; in fact, let them "root, hog, or die," and wallow to their hearts' content. The roots they may get are their natural food, and by frequent bathing in muddy pools they keep the skin in a lively, healthy condition, free from dandruff and vermin. A hog looks filthy enough when he first comes out of his cool bath in a mud-hole; but see him after he has dried the clay in the sun and rubbed it off on some convenient stump or fence-corner, and he is a nice, clean, and very presentable animal. After he has attained his natural growth in this manner, say from eighteen months to two years, he can be fattened on corn, if you will, without fear of disease. That the disease once started is easily communicated by contagion and infection I have easily found by tracing its ravages in regions of my inquiries. Starting from a diseased hog brought into the neighborhood, it next showed itself in the herd of the only neighbor who let his hogs run at large, and whose hogs visited an infected farm. Thence it was conveyed by the hogs of the second party dying alongside of a large pasture filled with well-fed, well-watered hogs. Then other neighbors' hogs broke into this pasture and mingled with the sick hogs, and soon went home to die of the disease and infect others. Others, again, separated by a large creek, crossed to the infected neighborhood and were soon numbered with the dead. During a dry, south wind, lasting several days, hogs one mile to the north, separated by the same creek, developed the disease. Thence it was traced in the same manner, carried either by straying hogs or dry winds, and in the case of hogs always in the direction of the wind, and then often jumping two or three farms for favorable material.

Treatment.—Under this head I will necessarily be very brief, for unless the case is taken early in the disease, *i. e.*, unless the pig-raiser understands the early symptoms of the disease and adopts what might be called the heroic treatment at once, little, if anything, can be done by medication.

After fully satisfying myself as to the nature of the disease, I found by taking the case in its incipency and giving a good cathartic (calomel 5 to 20 grains, and podophyllin $\frac{1}{2}$ to 2 grains, according to age) in boiled potatoes at night, to be followed each morning for two or three days by sulphate cinchoneidia 10 to 40 grains, according to age, in slops, and after and during this treatment give spirits turpentine (5 to 20 drops), or carbolic acid in slops (1 to 3 drops) every four hours, resulted in a cure in 80 to 90 per cent. of cases treated. In addition I would follow suggestions recommended in prevention of the disease, *viz.*, isolate the sick; keep them in pastures with free access to water and clay. Clay is one of our best antiseptics, and the hog knows it, and will when thirsty, if he can, mix it with the water before he drinks. Give them but little, if anything, to eat, and, if any, such vegetables as turnips, parsnips, artichokes, and other food of this class. By no means feed corn, especially dry corn. I really think that if the suggestions as to the manner of breeding, feeding, and caring for the pig here offered were followed out there would be but little, if any, need for treatment.

Before closing I wish to acknowledge my indebtedness to Maj. James S. Mellen, of Saint Louis, for many and valuable suggestions.

I am yours, very respectfully, &c.,

J. N. McNUTT, M. D.

PEVELY, Mo., October 14, 1878.

REPORT OF DR. C. M. HINES.

Hon. WM. G. LEDUC,

Commissioner of Agriculture :

SIR: Having been honored with an appointment as an inspector of diseases of domesticated animals, under the direction of the Department of Agriculture, I accepted the same on the first day of August, and at once took the necessary steps to find a field for an investigation, which had reference more particularly to the diseases of swine.

After diligent inquiry I found the disease was not sufficiently extensive in the State of Kansas for any extended inquiry into the cause and remedy for "hog-cholera," or the infectious fever of hogs. Under instructions from the department I therefore proceeded to Cass county, Nebraska, where it was said to prevail as an epidemic in the neighborhood of Eight-Mile Grove.

Upon my arrival at Plattsmouth, the county seat of Cass county, I was informed that no "hog-cholera" had prevailed in that region for nearly three months prior to my arrival.

After a detention of several days in the vain effort of finding a proper conveyance into the country, I at last succeeded, being aided by Mr. James Hall, of Eight-Mile Grove. I was assured that I would find but little of the disease, as I was too early in the season, it being more prevalent in cold weather.

As the time for investigation was limited, I determined to make as much of it as possible. Passing through Cass county I found several small herds under treatment by a veterinary surgeon, and in nearly every case I found they were being "doctored" by the owner, or some one professing to cure the disease. Also, other owners, rejecting all interference, were apathetic, and seemed to consider it something beyond human ken, and as one expressed it, left them to "worry through." Indeed, one farmer said that he intended as soon as he was sure the disease was in the herd, to "ship all those large enough for the market"—an example followed by many others, making widespread havoc. From Cass county I proceeded through Otoe, to the borders of Johnson county, passing over a large portion of both counties, returning again to Plattsmouth when the time for the investigation had nearly expired.

In arriving at the conclusions to be found in this article, I must be permitted the privilege of argument, in order to show my reasons for the same, and, first, I would observe that the disease known as "hog cholera," or "infectious fever of hogs," is not, as I think, so difficult of solution, nor has it a protean character. I consider it *one disease from two causes having two effects*.

The hog is said to be improved by "crossing," and persons ignorant scientifically of its effects, and how far it may be carried with propriety, write and speak learnedly of the matter. They attempt to improve upon nature, and it has been carried to such an extent as to almost obliterate all traces of original breeds. They attempt also to make a distinct, separate, and, as they suppose, *permanent* stock that will reproduce itself. Although all hogs may belong to the one great family, there is a law in nature that, where a great divergence has taken place from any parent stock, a tendency to revert must prevail, or the creature must suffer from the *lex talionis natura*. "So true is it that nature has caprices which art cannot imitate."

Persons, otherwise good farmers, who have improved their stock, as

they suppose, by crossing or continual breeding in the same stock, do so until they are really ignorant of how close they are breeding, and of its evil effects, for (as in the human being) the penalty for this violation of the law of nature is loss of vitality, less power of resisting diseases, and scrofulous degeneracy.

I have seen pigs not a month old which were totally blind, with large sores on the jaws, and hogs of eight or ten months with great sloughing sores on the body, and I have been told by reliable gentlemen that some lose the flesh from the jaws, leaving the bone exposed. In the older hog this affection may, perhaps, be brought about by feeding exclusively upon old corn that had been exposed to the elements, but time did not allow for proof of this.

Cholera in Kansas and Nebraska seems to attack preferably the Berkshire, and the Berkshire crossed by the Poland-China, which appear to be the kinds preferred in those States. The "common stock," and those not bred so close, are not so liable to the disease as where they have been continually crossed and called "fine-blooded." I have been told by gentlemen who are largely engaged in hog-raising that the common stock and those of pure breed are less liable to the disease—that they have been in adjoining ranges to those diseased, and have escaped the infection. I have no doubt of this fact.

TREATMENT OF THE HOG, HIS FOOD, QUARTERS, ETC.

Of food.—As Dr. Detmers, of Missouri, in a report upon this same subject says, "Because he is a hog, must he be treated hoggishly?" Poor hog! Man seems to think he "has no *stomach* that he need respect." With what do they not dose him (in lieu of what he would find for himself, were he at liberty?) *Stone coal, charcoal, ashes, concentrated lye!* Give him sour food, and afterward an alkali to correct acidity of stomach! All very good when intelligently administered, no doubt. But, does not the hog need an acid sometimes as well?

The almost universal food for swine in these States is corn, *nothing but corn*. If, perchance, they get any green food it is green corn cut and thrown to them.

Corn is raised in such abundance and the price is so low, in order that there may be a return for the labor of the farmer it must be converted into either beef or pork; and as, according to general belief and practice, a hog requires less care than other domestic animals, and can *stand anything*, he is the favorite instrument through which to realize gain, and every farmer has his herd of hogs, large or small.

Of quarters.—The laws of the States of Kansas and Nebraska prohibit the running at large of domestic animals, and, as a consequence, the hog is confined in quarters of various kinds and dimensions, dependent upon the ability, inclination, or industry of the farmer. Thus we find that in a prairie country where fencing is expensive they are not apt to have too much range.

In that part of the State of Nebraska to which my observations extended nearly all the farms were located on water-courses of variable size, and for convenience the hog-pens were on the banks of the streams, in many cases at an inclination of from 15° to 25°. The inclosures were full of manure of perhaps years' standing, mixed with earth of the kind known as the loess deposits, into which the hogs rooted, wallowed, and when sick they would eat, in a vain effort to relieve their sufferings. (In many cases scarcely anything else was found in the alimentary canal.)

They had at pleasure the privilege of indulging in a bath of or drinking the semi-fluid matter in the streams passing through their inclosures, composed of old and recent manure, with an admixture of the black soil and material of a like character conveyed to them from sties fifty or a hundred miles above. They might also at their pleasure, after such recreation, bask themselves in the sunshine (with the mercury in the nineties) on the hill-side the livelong day.

Fed with corn that had been exposed to the snows and rains of *one* and sometimes *two* years; heated by the sun in summer, cooled by the snows of winter, washed by the rains of spring, and fanned at pleasure by rude Boreas, is it to be wondered at that animals so treated, and from which so much is expected, should become diseased and die, and that, following the example of the farmer who said that he would "ship his hogs as soon as he was satisfied disease was in his herd," the "hog-cholera" should continue, being spread by rail over a great extent of country, dropping some *here* and some *there*? True, all are not so treated, and where they are treated in a rational manner few are lost.

If the same attention was given the hog that is bestowed on other domestic animals there would be less cause for complaint, and it is useless to attempt to remedy the matter except by a radical change in the treatment of the animal.

Many farmers keep their corn in cribs without covering, and one who was losing hogs every day told me that he had been feeding them on corn that had been exposed to the elements for *two* years. I have found that in proportion to the care taken so was the ratio of health and disease, all other things being equal.

The causes, then, in my opinion, which develop the disease known as "hog-cholera" are of two kinds. First, *continual close breeding*, which has a tendency to lessen vitality, produce a scrofulous condition of body, with less power of resisting disease; second, want of proper treatment, which includes food, quarters, and general management.

SYMPTOMS OF DISEASE AND MODES OF ATTACK.

First mode of attack.—Generally the hog is sick a considerable time before it is noticed, and he is not cut off as suddenly as many suppose.

The hog's external depurating apparatus is said to be fixed in the posterior portion of the fore leg and the nose. When the disease sets in the discharge from these parts ceases, and often (especially in young pigs) a swelling of the fore leg may be noticed, extending to the shoulder. The nose becomes dry, and the hog now has the fever. His bowels become constipated, and when moved by the administration of a cathartic his discharges are of scybala, coated with mucous or epithelium. His appetite fails, and he eats what is unusual for him in a state of health, such as dirt and herbage, that, when well, he would pass by. He lies down, or leans against the side of the inclosure, and when started up moves wearily. Two moist streaks may be seen, one from each eye; holds his head down, and his ears fall; when lying down rises up and falls down; stumbles along as though he had rheumatism; is weak in the fore legs; becomes lousy, and if he does not die by the disease which fixes itself upon the brain and spinal cord, he may recover, but is often left entirely blind. If recovery or death does not take place in this first mode of attack, he passes into the condition of those under the second mode of attack, and the force of the disease is exerted upon the

mucons membranes of the alimentary canal. In this first mode of attack the disease is seated in the serous membranes.

Second mode of attack.—Begins with fever, as in the first mode, but, although the brain is affected, the force of the disease is exerted more directly upon the stomach, bowels, and lungs (upon the mucous membranes). The hog loses his appetite, grows rapidly thin, and instead of the discharge from the eyes it is from the bowels. He lurches from side to side as he moves along, is weak in the loins, has diarrhea, often vomits, and worms are sometimes discharged from both stomach and bowels. The discharge from the bowels is of a yellow color, seemingly mixed with pus. In this mode of attack all the parasites that infest the hog, of whatever character, seem roused to unusual activity, and the hog, unable to partake of a sufficient amount of nourishment, these parasites, fixing themselves in many parts of the body, prey upon its vitals until it succumbs.

Cough is a prominent symptom, sometimes from the first; is of a spasmodic character, and apparently due to some extent to nervous irritation. In some cases, at every fit of coughing there would be a discharge from the bowels.

Character of the disease.—As before stated, it attacks first the serous, secondly the mucous membranes, or it may be confined to either.

In the first mode of attack the fever is of a sthenic character, and presents many of the characteristics of *measles* in the human being. There is fever, discharges from the eyes, sometimes a discharge from the nostrils, and discoloration of the skin. Cough, which is an attendant upon measles in man, is generally absent in the hog in the beginning of this disease. I prefer to consider it a fever developed in the same manner as typhus or typhoid fever is in man; that there is "blood poisoning," and that the disease germs are intangible; that it has no symptom in common with cholera in man, save the diarrhea. The action of the infection upon the blood is quite the opposite to that of cholera, for in the disease in question there is a lack of fibrin and of hæmatin; it is pale, deficient in red corpuscles, and does not "cup." I do not believe that it is dependent upon any particular condition of the atmosphere, except that portion immediately surrounding the diseased animals. I think there can be no doubt that it may be communicated to other hogs, and more readily to those of a like breed, and living under like conditions. Being (as I think) not primarily of a *typhoid* character, I cannot see any reason why this term should be applied to the disease. The truth is, I believe, that the hog is sick some time before it is generally noticed, and that a little attention given him at the commencement will stop it. Is this, then, of a typhoid character? In confirmation of this I will state a little circumstance related to me by a gentleman in this neighborhood. A colored barber called upon him at his farm one day, and while looking at a fine hog, which the owner said would eat but little, and appeared to be sick, the barber said: "Your hog has the cholera. I will cure him"; and immediately, to the great amusement of the gentleman, caught the hog, opened his mouth, made two incisions in the papillæ at the root of the tongue, and then began rubbing the fore-legs of the animal with a corn cob. Telling the gentlemen to give the hog a dose of some purgative medicine, he went his way. In a few hours the hog began to eat and recovered in a short time.

Of infection.—Hogs of the same class, and placed under like circumstances, are more liable to convey the infection to each other than to those differently situated. I met with a farmer in Nebraska who was

purchasing diseased hogs at a low figure, and taking them on his farm for treatment, without fear of communicating the disease to his own herd. He had some knowledge of the disease, and had treated his own herd.

Professor Law says, as quoted by the commissioner of agriculture of the State of Virginia, "contagion is the main cause of the disease." We are satisfied that we understand the circumstances under which one may contract the chills or intermittent fever, but I presume no medical man will say that he can *touch* the "disease germs," as they are termed. Contagion cannot *cause* it, but may aid in spreading it.

Prevention of the disease.—In my opinion the surest means of prevention are those of a hygienic character. Do not breed close, give the animal a variety of food, keep his range clean, and protect him from extremes of heat and cold. In a prairie country, where domesticated animals are not allowed to run at large, I would recommend that ranges for the hog should be inclosed by portable fences in sections. Posts should be placed at the proper distances (they might be of iron and driven) and the sections wired together or fastenings might be attached to each section so as to unite at once. Constructed in this manner the range may be changed to another location in a few hours. This should be done once or twice a year at least, and preferably in the spring and the beginning of winter. Raise vegetables especially for them. If possible sow oats, and let them have the range of the field. Give them fresh water to drink, which may be raised by a windmill and conveyed through pipes to the range. Instead of having hogs to "follow" the cattle, as a matter of economy, I would feed them separately, and have the corn for the cattle ground in a horse-power mill.

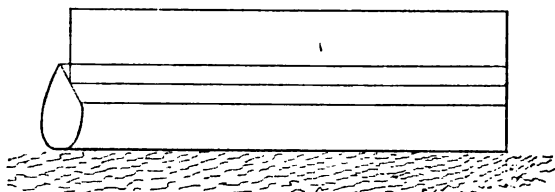
Eradication of the disease.—This might be effected partly through State laws prohibiting the transportation through the States of hogs showing evidence of disease, attention to hygienic laws, and a greater admixture of the breeds known as "common stock," gradually brought about.

Treatment of the disease.—This is very simple if attended to in time, and very few need be lost. Simply a transfer to a new range and a change of food at the beginning of the disease will save a great many. Give the hog a purgative of soft soap, raw linseed-oil, or any simple purgative; afterward warm mashies and comfortable dry quarters. Very often this is all that is necessary to arrest the disease. As soon as his nose becomes moist and the secretion is restored in his fore-legs, you may count upon his recovery. A farmer told me that his herd had the "cholera," and that he fed the living with the carcasses of those that died, and his hogs recovered. Another that, having more fresh beef than he wanted, fed the surplus to his herd, and they recovered. This food, being unusual, acted upon their bowels, hence their recovery.

In investigating this disease I had many obstacles to contend with. There were no herds to be found within a reasonable distance (nor beyond that I was aware of) which had not been dosed with something, and none so isolated as to be entirely free from contact in some way with other herds. As a consequence I made no use of the clinical thermometer, which would have given no perfect data to discourse upon.

The first herd of hogs treated numbered forty-five head, situated on high and dry land; but the range was dirty from the accumulations of old manure, they having been fed on corn from crib exposed to the elements for a considerable period. Were drinking water from a well. All sick. No other hog had been near the range except a boar, and he was said to be well; neither had any been away from the herd. The breed

was Berkshire, crossed with Poland China. Owing to the inland situation and want of necessary articles at the place the troughs were not made with circular holes, but were constructed in the following manner:



The trough was divided longitudinally by a board on edge so that the hogs could feed on either side without permitting the admission of the feet, thus: They were

graded 1, 2, 3, 4, according to age and condition. The herd was suffering from both modes of attack, as heretofore described. They were moved from their range and placed on new ground. As a general thing the younger hogs suffered the most.

Pen No. 1 contained the oldest hogs, fifteen in number, from one to three years old.

Pen No. 2 contained fourteen head, from eight months to one year old.

Pen No. 3 contained eleven head, from five to eight months old.

Pen No. 4 contained five head, from five to twelve months old, and was the *dead pen*.

No food was allowed for the space of twelve hours. Nos. 1 and 2 were given salt and water, which they were compelled to drink, being without food or water. This had the effect of causing vomiting and purging. In several cases worms were discharged from the stomach and bowels; principally from those suffering from the second mode of attack. Some had to be pressed forward and urged to drink. After the action of the salt the tincture chloride of iron was administered in water in doses of twenty drops every four hours, for the older, and fifteen for the younger hogs. A mash of bran was made (which was always fed while fresh and sweet), and they were allowed to partake moderately of the iron half an hour after the first dose. They were fed at intervals between the doses of iron, and no other food was given until convalescence began, when they were allowed some corn in connection with the mash. In those suffering from the disease in the first mode, there was constipation of the bowels, dry noses, and watery discharges from the eyes. When the bowels were moved (and in some instances they were very torpid), the passages would be stercoraceous, and covered with a white substance (apparently epithelium), were very hard, and upon examination appeared to be composed almost entirely of earth. These began to improve on the third, and were so much improved on the sixth day that they were allowed a more liberal supply of food. They were not considered out of danger until the eighth or tenth day. It was not necessary to give any other purgative, and gradually the discharges from the bowels became of a proper consistency.

No. 3. Most of these had diarrhea. Some had a cough, and whenever a fit of coughing came on there would be a profuse discharge from the bowels, thin and of a yellow color. Occasionally there would be vomiting also, showing the great irritability of the pneumo-gastric nerves. Worms would also, at times, be ejected from the stomach or bowels. To these were administered from one and a half to two fluid ounces of raw linseed-oil, according to the age of the animal. After the action of the oil the discharges were not so frequent, and the animals seemed more lively. Twenty drops of carbolic acid were then administered to the older, and fifteen to the younger hogs every four hours.

The action of this remedy not meeting my expectations, I had recourse on the third day to the tincture chloride of iron, as in the cases of Nos. 1 and 2. Fifteen drops were given to the older and twelve drops to the younger every four hours with marked improvement. The food given was the same in all cases. Convalescence in this class was slower than in Nos. 1 and 2, it beginning a day or two later, and the recovery was more protracted, with the prospect, in some cases, that a month or longer must elapse before they would be of any value.

No. 4.—*The dead-pen.*—In this pen were five hogs of different ages, ranging from five months to a year old. They were selected for this pen, as there was but little hope of saving them. Two were sick after the first mode of attack, and three after the second mode. Linseed-oil was administered in corn-meal and water. They had to be urged and brought up to drink. One utterly refused, and was too far gone to undergo treatment. He died in a few hours in convulsions, as in the first mode. The morning after two more were found dead, and the next day another died. These latter were after the second mode. One after the first mode recovered. The tincture chloride of iron was administered to these also. As they began to improve, which was in from six to ten days from beginning of treatment, they were fed more liberally according to their condition. The pens were kept clean, the manure being removed at once. Chloride of lime was used as a disinfectant.

The loss was four out of forty-five hogs. Together with the foregoing treatment, the following was administered every four hours, between the doses of iron: Powdered alum, ʒiiss ; sulphur sub., ʒiiij ; powdered saltpeter, ʒiiss ; flaxseed-meal, ʒix . These were mixed, and two pounds of the mixture was added to every barrel of mash in which it was given.

The second herd treated numbered originally 123 head; several had died, reducing it to 114. The breed was Berkshire crossed with Poland-China. They had been bred very close. This was a bad lot to treat, as they had been dosed with "condition powders," "concentrated lye," and several other articles. They had been fed on corn exclusively. Their range was located on a hill-side, and a stream of water passed through it. It was covered to a considerable depth with old and recent manure, exposed to the sun, and without shelter for the hogs. The stream was thick with mud and manure, where the hogs could wallow at pleasure and bask in the sun all day. There were other ranges above and below; the number I have no idea of, but presume that every farm located near this stream had its range on it, as it was common so to do for convenience. No other hogs had been brought there, and none taken away and returned.

The herd was moved to new ground in the shade, and graded according to size and condition. They were divided into five classes.

First class.—This consisted of eighteen hogs, the ages ranging from one to three years. They were suffering with symptoms belonging to the first mode of attack; had no cough. The bowels of some had been moved by remedies, others not. Could partake of some food, but not heartily. They were treated together.

Second class.—This consisted of twenty-one hogs, ranging from one to two years, and were suffering from an attack after the second mode. They had cough and diarrhea.

Third class.—This consisted of thirty-nine hogs, ranging from five months to one year old, suffering from an attack after the first mode.

Fourth class.—This consisted of twenty-six hogs, ranging from five months to one year old, suffering from an attack after the second mode.

Fifth class;—dead-pen.—This consisted of ten hogs of different ages.

Three were after the first mode and seven after the second mode of attack.

Believing that the theory of *blood-poisoning* was correct, I did not see any reason for a change of treatment from that followed in the case of the first herd. Those suffering from the disease by the first mode of attack were first given salt and water and afterward the iron, as in the case of the first herd. Those suffering from an attack in the second mode received a dose of linseed-oil, and afterward the iron and powder as detailed in the case of the first herd. Many had to be urged and forced to drink. Some refused altogether to partake of anything. I sum up the deaths by class:

Of class 1	None.
Of class 2	2
Of class 3	3
Of class 4	5
Of class 5	8
Total number of deaths.....	18

Nine had died before treatment, making twenty-seven in all.

Post-mortem examinations.—In making *post-mortem* examinations, I was afforded opportunities in Nebraska (besides those under my own observation), by Mr. A. J. Rainey, a veterinary surgeon, who had a large number of animals under treatment. Also, by a Mr. Dudley, an enterprising farmer residing in the neighborhood of Syracuse, who gave me permission to examine his herd, in any manner I saw fit, in furtherance of my object.

In my description of appearances after death, I shall confine myself to one or two dying under each mode of attack.

Hog six months old.—*The blood.*—This had the appearance of water colored yellow. Fibrin broken up, and a want of hematin. Excess of serum and salt. Poured upon the ground it was absorbed, leaving scarcely a perceptible stain.

The brain.—Effusion of serum in cavity of skull, and softening of the brain. Effusion in the membrane of the eye.

The lungs.—Effusion of serum in pleural cavity. Base of lungs somewhat congested, apparently of a passive character.

The heart.—Normal condition, but pale.

The stomach.—Normal condition, the spleen enlarged.

The liver.—There was but little bile in the gall-bladder; the organ was darker in color, with petechial spots. Kidneys pale. No ulceration of intestines. This hog died from the first mode of attack.

Hog six months old.—This hog had recovered from an attack in the first mode. Was left blind, and had an ulcer on one of his feet. He was killed. Was apparently free of disease; the blood was of the proper consistency and color, and coagulated. Blindness was the effect of the disease.

Examination of those dying from second mode of attack.—*Hog six months old.*—This hog was very thin, nearly all the fat having been absorbed. Could detect no disease of the brain. In this case there was the usual diarrhea, cough, &c., belonging to this class. Heart normal in structure, but pale. No effusion in pleural cavity.

Lungs.—These presented the appearance mentioned by writers on this disease as gray hepatization.

Stomach.—This presented evidences of disease. Two ulcerated patches were found, nearly healed, circular in form, and eight or ten inches in diameter. The dead mucous membrane was still adherent, but was easily removed.

The liver was discolored; dark patches were diffused over its surface. One large worm (*Ascaris lumbricoides*) was found in the duodenum. There was a large ulcer, about an inch in diameter, in the ascending colon, plainly seen on the external surface of the intestine. Its edges were very hard, and the inflammation extended some distance beyond. There were other ulcerations in different parts of the intestines, but less extensive.

The spleen was of natural size, but darker in color.

The kidneys presented a grayish appearance, very pale, and having an appearance as though there had been a deposit of black pigment in their substance. They were easily broken up, the internal portion or belly showing evidences of suppuration.

The bladder.—This organ was intensely inflamed, so much so as to diminish its capacity to one fluid ounce. All the organs in the course of the alimentary canal had more or less petechial spots on them.

Hog five months old.—Killed him. He was very much emaciated. Was apparently recovering from the disease, but very slow and doubtful. Found three large worms in the stomach and one in the duodenum. The one in the duodenum had his head inserted in the gall duct up to the gall bladder. There was some chronic inflammation at the upper portion of the duodenum where the worm had fixed himself. The stomach of the hog was full of grass. It seemed that this hog would have to die of inanition, the presence of the parasite interfering with the flow of bile into the alimentary canal.

Geology of the district of country where these examinations were made: The soil is of what is termed the "Loess deposits," and by analysis by Samuel Aughey, Ph. D., contains—

Insoluble (siliceous matter)	81.28	Soda .....	.15
Ferric oxide	3.86	Organic matter	1.
Alumina .....	.75	Moisture	
Lime, carbonate	6.07	Loss in analysis	
Lime, phosphate	3.58		
Magnesia, carbonate	1.29		100.00
Potassa .....	.27		

Parasites.—Of the entozoa that infest the hog I have seen but three kinds. Two of those are familiar to most persons, and are found in man. The third is a smaller parasite, and is often found in the stomach of the hog, and which is said at times to destroy the pyloric orifice of the stomach. I have seen but one of this species; it was white, and from eight lines to an inch in length.

I append a statement by some farmers in Kansas, who are successful hog-raisers, as to their treatment of hogs. Mr. Jacob Allen, of Neosho county, says: "Last year my hogs had the fever, or 'hog-cholera.' They would eat dirt; dirt was found in lumps in their stomachs; but few worms, and those in intestines and kidneys. No trichina under microscope. Were constipated. I lost some; cured the others by the use of senna and jalap."

Rev. John Schoemakers, of Osage Mission: "Has been a resident here for thirty years, and states that he is of opinion that the disease comes of want of proper management, forcing them with corn, and want of a variety of food." He states that they have a large number of hogs on the Mission farm, but that they lose none by cholera. They are let run in a large field that has been under cultivation. Does not confine them to pens.

Mr. David Bloomer, of Neosho county, feeds his older hogs corn in the winter and spring. Sows oats for them in two separate fields, and at different times. When the oats are four inches high he turns them

into the field first sowed, and afterwards into the second field, so as to keep them until corn is "out of the milk," when he cuts and feeds them corn. Feeds his pigs on oats and shorts during the winter. Lets the sows wean the pigs. Breeds his sows twice a year; first litter to come about the 20th of February, next litter the 20th September. After the green oats are gone he turns them into a pasture of 120 acres. They have access to clear running water and to shade in summer. Has cover for pigs in winter, but none for old hogs. Does not "shuck" his corn, and keeps it always under cover. Breed, pure Berkshire, not bred close. Loses no hogs by cholera.

In conclusion I have to state that of other diseases affecting animals in the States of Kansas and Nebraska, there were an unusually small number, and only of those familiar to nearly every one.

In giving a name to the disease known as "hog-cholera," I have no hesitation in saying that the disease in the latter stages has all the characteristics of gastro-enteric fever in man.

Very respectfully, your obedient servant,

C. M. HINES, M. D.

OSAGE MISSION, KANS., October 29, 1878.

PREVALENCE OF DISEASES AMONG DOMESTICATED ANIMALS.

By a perusal of the subjoined correspondence of the department, it will be seen that there has been no abatement of diseases among domesticated animals during the current year. Those incident to swine seem to have been quite as prevalent and almost as fatal and destructive to the animals attacked as they were during the year 1877. The per cent. of deaths for the last-named year was given at 58.94, while this year it is given at 52.75. Now that the disease which has been so destructive to this class of farm animals has been shown by recent investigations to be highly infectious and contagious, proper care and vigilance on the part of farmers and stock-growers will lessen the spread of the plague, and confine it to such limits as to greatly reduce the heavy annual losses of the past few years.

Many diseases of a malignant and contagious character have prevailed among other classes of farm animals the past year, which will receive the attention of the department during the coming season.

ALABAMA.

Bibb County.—The losses from cholera among hogs are annually very heavy. At least 40 per cent. of all the hogs in the county suffer from this disease, and 75 per cent. of those attacked die. Cholera is also prevalent among fowls, and large numbers of them die.

Clarke.—A few horses annually die in this county of farcy, a fatal contagious disease, and a few from want of care and proper attention, the latter mostly owned by negroes. There seems to be no disease among stock-cattle. Both hogs and chickens die of cholera.

Cullman.—There is some murrain among cattle, and considerable cholera among the hogs and chickens in this county. There is but little stock raised in the county.

Escambia.—The only class of farm stock affected by contagious diseases in this county is that of swine. These diseases have been a great drawback to hog-raising.

Jefferson.—Horses suffer severely from distemper. Cattle are occasionally affected with black tongue and murrain, but at this time are unusually healthy. Hogs are seriously affected with cholera, quinsy, and other unknown diseases. The losses have been very heavy this season. Cholera and roupe prevail among fowls.

Lauderdale.—We have had no infectious or contagious diseases among horses or cattle in this county. They suffer terribly, however, during the winter for lack of food and proper attention. At least five hundred horses and mules, and a greater number of cattle, are annually lost from this cause. Hog-cholera prevails here every year, and the losses are sometimes enormous. I estimate that between 7,000 and 8,000 head have been lost during the past year. The condition of farm stock generally is low—worse than at any time since the war.

Madison.—No infectious or contagious diseases prevail among farm animals in this county. Hogs frequently die of so-called cholera. Fowls are afflicted with the same malady. The general condition of farm animals as compared with previous years is good.

Monroe.—A few hogs only have been lost by disease in this county this year.

Saint Clair.—Stock in this county is in very good health and condition. I hear of no infectious or contagious diseases.

Walker.—Horses are seriously affected and frequently die of epizootic distemper. A good many cattle are lost by murrain and black tongue, and many hogs die of cholera. Fowls die of cholera and a disease which affects their throats. There are but few sheep raised in this county; but this industry is on the increase.

ARKANSAS.

Baxter County.—The graded calves of this county have this year suffered severely by a disease called black-leg. The first symptom is a lameness, and they usually die within from twenty-four to thirty-six hours. No remedy has been found. About one-fifth of the calves have been attacked, and nine-tenths of those attacked have died.

Boone.—The only diseases of any moment that have prevailed among farm animals the past year are those incident to swine. The losses have not been very heavy.

Bradley.—Horses, cattle, and sheep are free from disease. About 10 per cent. of all the hogs in the county have died during the past year from eating cotton-seeds and lying in the dust. Cotton is the only product that is raised here for the market.

Fulton.—Hogs in a few localities of this county have been fatally affected with cholera.

Grant.—Chicken-cholera is prevailing here to an alarming extent. The hog-cholera has somewhat abated. There are no diseases existing among horses, sheep, or cattle, of a serious nature.

Marion.—Horses and sheep are very healthy, and cattle moderately so. Many of the latter have died this season of black-leg. Many fowls are annually lost by a disease commonly known as cholera. A great many hogs have been lost this season in this county by an unknown disease. It is not cholera, but more resembles yellow fever in man.

Monroe.—Cholera among hogs and fowls prevails here every year, and usually proves very fatal. All other kinds of farm stock are healthy this year.

Montgomery.—Horses, cattle, and sheep are proverbially healthy, at least the exception is so small that it is not worthy of note. Until this summer hogs have been healthy, but cholera is prevailing extensively among them at this time.

Perry.—The health and condition of farm animals is generally good. Diseases among hogs continue to prevail at irregular intervals.

Pope.—Occasionally a horse dies here from bots and blind staggers, and sometimes from bad treatment. Fine cattle brought here from other States frequently die of murrain. Hogs suffer terribly from what is called cholera. In some localities it kills almost every animal. Fowls also suffer from cholera. Sheep die of rot and bad management.

Serier.—All classes of farm stock are healthy save that of swine, and a good many of these animals are dying in the northern part of the county of cholera.

Saint Francis.—A new disease has appeared in this neighborhood among cattle; it first appeared among sucking calves, but has lately carried off several grown cattle. The symptoms are a trembling appearance and gradual prostration, which ends in death in from three to seven days.

Stone.—All classes of farm animals have been unusually healthy during the past year in this county.

White.—At least one-third of the hogs in this county have been afflicted with disease during the past year, and of this number eighty-five per cent. have died.

CALIFORNIA.

Calaveras County.—We have never had any infectious or contagious diseases among any class of farm animals. Every year we lose a greater or less number of animals by starvation. Last winter probably ten per cent. of all the cattle and sheep in this county died from this cause alone. In 1862 fully three-fourths of all the cattle died for the want of feed.

Contra Costa.—Hogs here are subject to cholera and pneumonia. These diseases are brought on by lack of proper care and attention.

Lassen.—There are no infectious or contagious diseases prevalent among domesticated animals in this county.

San Bernardino.—This portion of California has always been remarkably healthy for all classes of farm animals. No contagious disease has ever prevailed here except scab among sheep, and this disease never destroys the animals.

San Diego.—The only disease existing among cattle is murrain; this disease is very fatal, especially in dry seasons. Hog-cholera is not known here. A good many sheep are killed by eating poison-weed after our spring grasses are dried up. We lose a good many fowls from a disease known as swelled head.

Shasta.—Horses in this district are annually afflicted with an epizootic distemper; if properly cared for but few of them die. Cattle and hogs are healthy. Sheep are affected with scab, but when washed and properly treated but few are lost. Our State is turning some attention to the Angora goat. I think the raising of these animals will eventually make the best business of the State. California contains a vast extent of country adapted to the roving of this animal which is fit for nothing else. It subsists entirely on brush, and seldom, if ever, grazes.

Tuolumne.—Farm animals of all kinds are in a healthy condition. The weather is mild, and feed is starting.

Yuba.—A kind of epizootic disease is seriously affecting horses in this county. Diseases among cattle are generally caused by want of proper care in winter. Cholera prevails among hogs and fowls. Sheep become diseased for want of proper care, and keeping too many together.

COLORADO.

Bent County.—Neither horses nor cattle are affected with infectious or contagious diseases here. Cattle-raisers estimate their annual losses at about 5 per cent. A few sheep are lost by a disease known as scab. Stock is in extraordinary good condition at this writing.

Gunnison.—This is a new county, and there are not over one thousand horses in it. About half of these have suffered this year with epizootic distemper, but none have died. There are no hogs or sheep in this county. There are a few fowls, but they are entirely free from disease.

San Juan.—There are no domestic animals raised in this county, and none are wintered here. During the early summer there are quite a number of animals poisoned by eating a weed which the Mexicans call "Loco." The botanic name of this weed is unknown to the writer.

DAKOTA TERRITORY.

Brule County.—There is but little stock in this county. No disease of a serious character prevails.

Lake.—A few horses have died of distemper this year, and a few calves and cattle have been lost by the disease known as black-leg. Fowls are affected with rough, scabby legs, and perhaps 10 per cent. of them die from this disease very suddenly and while in good condition.

Pembina.—This is a very new county, and contains but a few farmers and little stock. What little we have is healthy, and free from all infectious or contagious diseases.

Trail.—A contagious but not very fatal distemper exists among horses in this county. The symptoms are a discharge from the nostrils, and swelling of the throat to such an extent as to prevent even the swallowing of water for three or four days at a time. Pants when driven severely, and his tongue hangs out of his mouth.

DELAWARE.

New Castle County.—Chicken cholera prevails this season. The best preventive is a tea made of smartweed, and placed easy of access to the fowls. Condition of farm animals, "good and improving." We believe the best stock and the best care will insure most satisfactory and profitable results.

FLORIDA.

Calhoun County.—Cattle are generally affected with black tongue, hollow horn, and murrain. Horses suffer to a considerable extent with staggers and scurvy; and many hogs are annually lost by cholera and staggers.

Columbia.—Native horses are generally much more healthy than those brought in from Northern States. Cattle have been generally healthy, except in a few localities, and in these the losses have been quite heavy. About one-third of the hogs in the county have died from cholera, and the thumps; the greatest fatality ever known has occurred among fowls this year.

Dural.—There is no disease of any kind existing among farm animals here, except a disease known as salt sickness, which affects cattle only. Diseases affecting fowls are attributable to lice, and are contagious because they are infected by contact. They receive no care. The breed is wild; they are rarely fed, and the only wonder is that they do not all die.

Lafayette.—There are but few horses in this county, perhaps not over fifty head, and but little attention is paid to raising or caring for them. There are about 3,000 cattle in the county. They depend entirely on wood range for subsistence, and are generally in bad condition. Hogs subsist on mast, and do very well. No sheep are raised here. During the summer fowls are afflicted with cholera.

Lery.—Staggers among horses is very fatal, especially among young animals. Epizootic distemper is the most fatal infectious disease among this class of animals. Cattle are affected with what is known as "salts"; called this, perhaps, for want of a better name. Hogs are subject to cholera, sheep to black tongue, and fowls to "sore-head."

Madison.—Distemper and glanders are the only contagious diseases prevailing among horses in this county. Cholera has been very destructive among hogs. A few cases of thumps have been reported among the same class of animals. Many fowls have died of cholera and sore-head.

Polk.—The losses of cattle in this county, from various causes, amount to about 5 per cent. of the whole number. But few horses are raised here, and sheep are just being introduced. Fowls do not do well; the climate seems to be too warm for them.

Saint John's.—No sort of attention is paid to the raising of hogs or sheep in this county. I have not learned of a single person having an improved breed of pigs. All depend on the "razor-back" or "land pike." But little disease prevails among any class of stock.

Santa Rosa.—Very few cattle die from disease here, but a great many die from want of proper care in the winter, and food in the spring. Some few sheep die of rot or grub. Hogs are sometimes afflicted with fatal diseases.

Sumter.—Pink root or foot disease is quite common among white hogs, but does not affect black ones. Salt-sick is a disease common among cattle. We have no remedy, but some recover.

Suwannee.—Out of 60 head of horses recently brought here from Texas, 36 died, with no apparent well marked symptoms of disease. No other horses were so affected. Hogs are afflicted with so-called cholera, and chickens with what is here known as sore-head. The head of the fowl becomes very sore, and so much swollen that the tongue hangs out of the mouth, the eyes swell shut, and they soon die.

Volusia.—Horses and mules are seldom attacked by any disease except blind staggers and sand disease. About 60 per cent. of the first and 20 per cent. of the latter, attacked by these diseases, die. Cattle are affected with salt-sick and hollow-horn. The greater loss is from the former. Hogs and chickens are sometimes affected with cholera and other diseases.

Wakulla.—Horses, colts, and mules die of staggers, grubs, and colic; cattle of hollow-horn and hollow-tail, and hogs of thumps and cholera. Chickens also die of cholera.

GEORGIA.

Charlton County.—During the past twelve months hogs have died in greater numbers than was ever known before. We have no improved breeds, our hogs all being "land pikes." We have no remedy for the diseases which carry them off in such numbers.

Coffee.—Horses in this county are seldom attacked by contagious diseases. A few are affected with epizootic distemper, and a good many die of staggers. Occasionally one dies with colic or sand disease. Cattle are only affected with diseases brought on by poverty in the winter season. Cholera among hogs is the most dreadful and fatal disease we have to contend with. Sheep are sometimes affected with staggers and sore-head, but rarely die except from old age or poverty.

De Kalb.—The value of horses lost by disease in this county during the past year will reach \$5,000, and that of hogs \$8,000 or more. Immense numbers of chickens have also died of cholera.

Fannin.—Stock of all kinds have been remarkably free from infectious and contagious diseases in this county. Stock here is raised only for domestic purposes.

Forsyth.—Horses are affected with bots and staggers, and a good many cattle die of distemper and murrain, and hogs of cholera.

Hart.—The losses in this county from diseases among farm stock are generally very light.

Jones.—The only disease among cattle here is hollow-horn, and that, as a general rule, is produced by neglect in bad weather. Hogs and fowls have suffered severely with cholera the past two seasons.

Laurens.—We have no infectious or contagious disease among horses, cattle, or sheep. Disease prevails more or less among hogs every year. The general condition of farm stock is good.

Lincoln.—Farm animals this year have generally been exempt from infectious and contagious diseases. In a few localities chicken cholera prevails with more or less fatality.

Marion.—A few horses have died during the past year of epizootic and lung fever. Cattle and sheep are healthy. Cholera is quite prevalent and very fatal among both hogs and chickens.

Murray.—About 5 per cent. of the hogs and sheep of this county are annually lost by disease. Perhaps 2 per cent. of the cattle are lost by murrain.

Pulaski.—We have no contagious diseases among horses except distemper, and that rarely kills. Cattle are healthy, but hogs are more or less subject to cholera every year. The only disease affecting sheep is rot. Fowls have more or less cholera every year, which is generally very fatal.

Randolph.—The most fatal disease among horses which has prevailed here during the past year is staggers. Cattle are subject to a good many maladies, some of which are quite fatal. Cholera and big-shoulder sweep off a great many hogs annually. In some localities almost all the fowls have been destroyed by cholera.

Rockdale.—No diseases of a very destructive character have visited our farm stock during the past year.

Schley.—There are no diseases of any character prevailing among farm stock in this county. This section is most prosperous to the farmer, as there is a full crop of all products and good health throughout to both man and beast.

Screven.—The most prevalent disease here, and the most distressing one to the farmers, is colic in mules. It is very fatal, and generally kills within from five to ten hours. At least five out of every seven of those attacked die. It seems to be caused by an accumulation of wind in the body, and not in the intestines. The body swells to the greatest dimensions, and the most excruciating pains follow and continue until death.

Spalding.—The losses among farm stock in this county from the various diseases incident to the same will probably reach as high as \$16,000 for the current year.

Tattnall.—Staggers is the most fatal disease among horses in this county, and black-tongue among cattle, although more of each class die of poverty than from the effects of disease. Cholera is very fatal among hogs and fowls.

Turne.—There are no diseases prevailing among farm animals in this county except bots and distemper among horses and milk-sick among cattle; also, cholera among hogs.

Union.—We have no contagious disease among any class of farm stock, but a good many animals are lost every year from common and well-known diseases.

Washington.—Murrain among cattle and cholera among hogs and chickens are diseases that are proving very fatal here. Nearly all the animals and fowls attacked by these diseases die, as we have no remedies. Young animals and those being fattened seem the most liable to attack. Farm animals in this county are now in a better condition than ever before at this season of the year. One reason for this is that a large number of planters do their cotton-ginning by steam and water-power instead of with animals.

Wilcox.—A greater or smaller number of hogs die every year of a disease called cholera. All other classes of farm stock are measurably healthy.

Wilkes.—Hogs die annually in some localities in this county of a disease called cholera. Some years this disease is much more destructive than in others.

IDAHO TERRITORY.

Bear Lake County.—Horses are occasionally subject to a distemper which is regarded as contagious. The symptoms are heavy discharges from the nostrils.

Idaho.—This climate is very favorable to farm stock. All classes subsist on the abundant bunch-grass of the range during the winter, and disease is rarely known among them.

ILLINOIS.

Adams County.—A good many horses have died during the past year of distemper. As usual, the so-called hog-cholera has prevailed extensively, and has carried off stock to the value of \$25,000 or \$30,000.

Carroll.—All farm animals have been remarkably free from contagious diseases except hogs. Never before has there been so great a mortality among swine in this county. With pigs and shoats the disease has been most fatal. No remedies seem to be of any benefit, and no sanitary condition is a safeguard against attack. They are affected in a great variety of ways and apparently by different diseases.

Clark.—A mild form of epizootic distemper prevails among horses in the southeastern part of the county, and there have been some deaths. Hog-cholera prevails in a very fatal form in the eastern part of the county, and many hogs are dying. Chicken-cholera is also very prevalent and fatal.

Clinton.—A good many horses are every year attacked by an epizootic distemper, and about 5 per cent. of those attacked die.

Crawford.—Hogs frequently die of a disease commonly known as cholera. A great many chickens are annually lost by a disease of like character.

De Kalb.—Diseases among swine have prevailed to a most fearful and destructive extent among the hogs in this county during the past season. The losses are estimated at \$50,000 and upwards.

Ford.—Hog-cholera is about the only disease of consequence that prevails in this locality. It is sometimes very fatal and destructive.

Grundy.—At present hog-cholera is prevailing in one or two townships of this county, and many hogs are dying. A Mr. Ely has lost 160 out of a herd of 260 head, and the disease is still raging.

Hancock.—The value of hogs lost in this county during the past year will amount to over \$35,000.

Hardin.—Horses in this county are more free from disease at this time than they have been for three years past. Distemper in a rather bad form is the worst disease now affecting this animal. Cattle are also unusually healthy. Hogs are less affected with cholera than for many years past. Poke-root slop is the best preventive we have yet found, in addition to the burning of the dead carcasses. A law should be passed for the fine and imprisonment of any person who neglects this latter precaution.

Henderson.—The mortality among hogs for this year is greater than for any previous year. The losses up to this time will exceed \$80,000. I feel confident that injudicious feeding, in connection with insufficient shelter, are the predisposing causes of disease among swine.

Iroquois.—During the past few months the number of hogs lost in this county by disease has been immense. Several breeders of fine Berkshires have lost their entire herds.

Jackson.—Hog-cholera is the only disease that has seriously affected any class of farm animals in this county.

Johnson.—Hog-cholera has prevailed to a limited extent this season, therefore the losses have not been very heavy.

Kankakee.—A large number of hogs have died of disease during the present year. Perhaps the aggregate of these losses would amount to \$15,000 in this county. About 1 per cent. of all the fowls die every year from diseases incident to them.

Kendall.—Hogs have been seriously affected with cholera. Other classes of farm stock have had the usual affections.

Knox.—With the exception of swine all other classes of farm animals have remained in good health during the past season. The mortality among hogs has been very great.

Lee.—Domesticated animals in this county have been remarkably healthy for the last year with the exception of hogs, which have died in great numbers. My own opinion is that the predisposing cause has been too close in-breeding, and a consequent weakening of the constitution and loss of vitality.

Livingston.—No infectious or contagious disease prevails among horses, cattle, or sheep. Diseases incident to swine and poultry are quite prevalent and fatal. I presume the diseases affecting swine are similar to those existing elsewhere.

McDonough.—The loss among hogs in this county during the past year has been very heavy—perhaps \$100,000 would not cover it. Other classes of farm stock have remained in their usual health.

McHenry.—Hogs in this county are seriously afflicted with infectious or contagious diseases. Some 2,500 have died from the plague. About nine-tenths of those attacked die, and the aggregate losses thus far will reach \$15,000. Other classes of farm stock are healthy, and their general condition above an average.

Macoupin.—Hogs and fowls are annually affected with cholera, and great numbers of each die of this disease.

Madison.—No infectious or contagious diseases have recently prevailed among horses and cattle in this county. Among hogs the cholera is quite prevalent and very fatal, reducing the number at a rapid rate. A great many fowls die from the so-called chicken-cholera and from gapes.

Monroe.—We have had a great deal of hog-cholera in this county. I think the disease is mostly caused by malaria, the result of filthy keeping and careless feeding. We also have chicken-cholera, for which we have no remedy.

Ogle.—Hog-cholera, or disease among swine, still prevails to a limited extent in some localities in this county, but is not so severe or so fatal as last year.

Piatt.—There is no infectious or contagious disease prevailing among any class of farm animals except among swine. Recently a malarial fever broke out among some imported stallions in our county, owned by Mr. Harvey E. Benson, and they all died. There were eight or ten of them in number.

Pike.—Hogs are generally seriously affected here with cholera at two periods of their existence, viz., in July, before they are old enough to wean, or between milk and

grass, and again just before they are old enough or large enough to fatten. Some die at all stages and every season of the year from the effects of this baneful and destructive disease.

Pope.—The only disease of any moment prevalent among farm stock in this county is cholera among hogs and chickens. The annual losses among both classes are very heavy.

Pulaski.—But few farm animals are raised in this county, and the losses from disease have been light during the past year.

Randolph.—What is known here as hog-cholera has prevailed in several parts of the county, but has generally been most destructive where large numbers were herded together. Cases are reported of several droves, numbering one hundred or more, where but ten or fifteen head, in all, recovered.

Sangamon.—Horses, cattle, and sheep have been healthy during the past year. There has been the usual loss among hogs and fowls, but the aggregate cannot be given in the absence of reliable data.

Schuyler.—Hogs are the only farm animals that have been affected with infectious or contagious diseases in this county during the past season. Great numbers of turkeys and chickens have also died of cholera, but I can give no idea as to numbers that have been lost.

Shelby.—During the past year hogs have died in great numbers in this county of cholera and lung diseases. The aggregate loss will amount to over \$60,000. A few horses have died of distemper, and a good many cattle of dry murrain.

Stark.—The hog-cholera has been very severe on some farms this fall, a good many farmers having lost nearly all their stock hogs and some of their fattening stock.

Stephenson.—The losses of swine in this county have been fearful. The class now dying are mostly shoats—last spring's pigs—and they are dying so rapidly in some localities that it is impossible for the farmers to hunt them up and bury or burn them, consequently the air is tainted with their carcasses.

Tazewell.—Immense numbers of hogs have died in this county during the past year of the various diseases which afflict them. No cure has been discovered for these maladies.

Wabash.—Cholera among swine seems to be the only disease affecting any class of our farm animals. About one-half of all the hogs in the county annually die of this disease.

Washington.—The usual diseases have prevailed among farm animals in this county during the past year, and the losses among all classes will reach \$3,000 or \$10,000 in value.

INDIANA.

Adams County.—The only class of farm animals affected by disease in our county is the hog. The disease seems to be epidemic and contagious, and has occasioned heavy losses among hog-raisers.

Brown.—The only disease of any consequence that has prevailed among farm animals in this county during the past year is cholera among swine.

Carroll.—Cholera has been very destructive among swine during the present year. The losses in this county will amount to \$38,000 or \$40,000. The symptoms are various and seem to defy anything like successful treatment.

Clay.—I doubt if this county at any time during the past eighteen years has been clear of the hog-cholera. In most herds it has been very fatal.

Clinton.—The losses in this county during the present year from diseases among swine will amount to over \$20,000.

Crawford.—The general condition of farm animals in this county at this time will compare favorably with previous years, and is fully up to an average, if not above.

Dearborn.—There has been but very little hog-cholera in this county during the present year.

Decatur.—All classes of farm animals in this county are healthy except that of hogs. These animals are affected with the usual maladies, and the losses have been very heavy during the last year.

Greene.—With the exception of hogs and fowls all classes of farm stock have been measurably healthy during the past season. Perhaps five thousand hogs have been lost during the year by the usual diseases.

Hancock.—The value of the hogs lost in this county during this past year from the various diseases affecting them will amount to over \$60,000.

Hendricks.—Our horses, cattle, and sheep are comparatively exempt from disease, but hogs and poultry are seriously affected. The losses among hogs particularly are very heavy.

Jay.—The only farm animals affected with disease in this county are hogs, and they die by the thousands. The disease affecting them is known as hog-cholera. About one-half of those attacked die. I think the disease is contagious.

Kosciusko.—Nearly 50 per cent. of the hogs in this county have died this season.

Some farmers have lost as high as 80 per cent. Some die of cholera, some of lung fever, some of cholera, while others are literally eaten up with worms. The flesh of the hogs fairly swarms with these worms.

Marion.—Hog-cholera is the only disease of any consequence prevailing in this county. The losses have been heavy.

Miami.—The losses to the farmers of this county from diseases among swine will amount to over \$20,000 for the present year. Cholera has been very destructive among fowls.

Ohio.—But few losses have been sustained during the past year from diseases among horses and cattle. Cholera prevails among hogs, and is frequently very fatal. Those fed on soap-suds and kept out of the dust seem to be exempt from disease. Plenty of lime, sand, and pure water will prevent cholera among fowls.

Shelby.—Horses, cattle, and sheep in this county are measurably clear of disease. Hogs and fowls, however, are reported as largely afflicted with cholera, from which many of them die. No remedy seems to prove effectual.

Stark.—The disease among hogs in this county is commonly known as cholera, although the symptoms are varied. The disease has not been very destructive this season.

Switzerland.—Some distemper exists among horses, but the losses have been comparatively small. Cattle are healthy and free from all contagious diseases. Hog cholera is prevalent, but not sufficiently general to discourage hog-raising. The losses from this disease will perhaps amount to one per cent. There is some chicken-cholera prevalent, but not sufficient to impede the business.

Tippecanoe.—For this and for several years past it would be safe to say that 50 per cent. of all the swine pigged in this county have died of what is usually termed hog-cholera. This year nearly all the farmers in this region have been afraid to feed their hogs, and have shipped them as soon as shippers could handle them at the summer packing-houses. The fine heavy hogs that the Wabash Valley used to produce are things of the past. All other kinds of farm stock are healthy.

Tipton.—Hog-cholera has prevailed to an alarming extent during the past year and has been very destructive. The disease is of varied symptoms. Some die very suddenly, while others linger for a few days or weeks.

INDIAN TERRITORY.

Cherokee Nation.—It will be several years, under the most favorable circumstances, before our people can hope to be as abundantly supplied with farm stock as they were before the late war; but it is encouraging to know that our people, by their vigilance and industry, have increased the number of their cattle, horses, hogs, &c., and now have not only sufficient for home supply but a small surplus to ship each year to distant markets. Among cattle the most serious and fatal disease we have to contend with is murrain. Hogs are afflicted with various diseases which are classed under the general name of cholera. The principal disease among horses is distemper, though they are occasionally afflicted with blindness and big-head.

IOWA.

Adair County.—Diseases are prevailing among horses and swine in this county. The losses in hogs have been heavy.

Buchanan.—The only epidemic that has prevailed among any class of farm animals during the past year has prevailed among hogs. The mortality among this class of animals has been very heavy.

Crawford.—Hogs in this county have been largely affected by cholera, and but few attacked by the disease recover. The greatest destruction has occurred among pigs. The losses are estimated at \$40,000 for the year.

Des Moines.—A few horses and sheep and a great many hogs have been lost in this county during the past season by disease.

Emmett.—A few colts have died here with a disease known as distemper. No disease among other classes of farm animals.

Fayette.—Perhaps \$3,000 would cover all the losses of farm animals in this county for the past year from purely contagious diseases, but the losses from all other causes would no doubt swell the aggregate loss to twice or three times this amount.

Franklin.—Hogs have remained healthy until within a few weeks past. Recently a number of fat hogs and shoats have been lost in this locality.

Guthrie.—Distemper is the most common disease among horses, and black-leg among cattle. The latter is more prevalent and fatal among calves than among grown cattle. Cholera and quincy prevail among hogs, and these diseases are quite destructive. Chickens have cholera, and I never knew one attacked by the disease to get well. Sheep are healthy.

Harrison.—Hogs are annually attacked with a disease known here as cholera, and a great many of them die. The past year has proven as disastrous as former seasons.

Humboldt.—This county has been remarkably free from all infectious and contagious diseases among farm animals. There has been some cholera and roup among chickens. The largest loss of hogs that I have heard of was five out of a herd of over one hundred head.

Ida.—Hogs are dying in this locality this year of inflammation of the lungs. About one-half the herds affected die. The animals die in about one week after the first symptoms are noticed. Those that recover from the disease do not amount to much. This is the first year that hogs have died of any disease in this county.

Iowa.—Among horses the only contagious disease prevailing seems to be a very serious distemper. It affects young horses to a greater extent than old animals. Quinsy and cholera have prevailed among hogs this year, but to a less extent than usual. The losses will amount to \$18,000 or \$20,000.

Jackson.—Cattle have been remarkably healthy, and so have hogs until within three or four months past. From information recently received I am inclined to believe that the losses will be heavy—heavier, perhaps, than ever before.

Jefferson.—Horses and cattle are healthy in this locality. Hog-cholera prevails in some sections of the county, but not in as malignant a form as usual. Still the losses have been quite heavy. Fatal diseases prevail among fowls, for which we have no remedy. The general condition of farm stock is above the average.

Johnson.—No disease has prevailed this year among either horses, cattle, or sheep in this county. The losses, therefore, are merely nominal. The loss of hogs is not so great as last year. The largest number of those that have died were young hogs, and therefore were of less market value. The disease, in all cases, was supposed to be cholera.

Lyon.—Until the past summer all classes of domestic animals have been extremely healthy in this county. During the past summer some herds on the Little Rock were affected with a disease claimed to be black-leg, which I doubt, but of which quite a number died. I notice that all animals well cared for through last winter have escaped. We have never had a case of hog-cholera in the county. I hear of no diseases among fowls.

Marion.—Hogs and sheep are less affected by disease than usual at this season of the year. No infectious or contagious disease exists among horses and cattle. Some seasons a great many fowls die of disease.

Marshall.—Hogs have suffered to a greater extent from disease the past season than ever before. The losses have been heaviest among pigs and shoats. The losses are estimated at from \$85,000 to \$90,000.

Monona.—Lung fever has caused some heavy losses among horses in this county during the past year. There have been some losses among cattle from black-leg and other diseases. Hog-cholera prevails, and the losses, as usual, have been very heavy. Almost all those attacked die. The few that recover are worthless.

O'Brien.—Cholera or influenza kill a good many hogs in this county every year, although the disease has never appeared as an epidemic.

Palo Alto.—The only contagious disease known among horses here is glanders or nasal gleet. Our young cattle are sometimes attacked with black-leg. I have never known farm animals to be in a more thrifty and healthy condition than they are this year.

Poweshiek.—Horses are afflicted with an epizootic distemper, which has caused many deaths. The mortality among hogs, from a disease supposed to be some kind of fever, has been terrible. The losses the present year, in swine alone, will aggregate from \$36,000 to \$40,000.

Sioux.—This is a new county, and but few farm animals are raised. The few we have are in good health and condition.

Story.—Hog-cholera has prevailed extensively, and has been most virulent and destructive during the past season. About one-half the hogs in the county have been attacked, and 99 per cent. of those attacked have died. The losses will amount to over \$30,000.

Woodbury.—The assessors' returns showed 9,982 hogs in this county this year. Ten per cent. of these were attacked by a disease known as cholera, and about all those affected died. I believe the disease to be an affection of the lungs. Horses are troubled to some extent with lung diseases, but other classes of farm stock are healthy and in good condition.

Washington.—No diseases of consequence have recently prevailed among farm animals in this county, aside from those incident to swine. Diseases among these animals seem to be most destructive where corn is the only diet. The losses during the year will reach \$40,000.

Wright.—During the last two years we have been greatly troubled with hog-cholera in this county. It is about the only disease of consequence among our farm animals

that we have to contend against. It has been very destructive to swine. We lose a few young cattle every year with a disease called black-leg.

KANSAS.

Allen County.—Cholera and congestion of the lungs carry off a good many hogs in this county every year. Scab in sheep and cholera among fowls also prevail to some extent.

Brown.—Hog-cholera is the only disease that has prevailed to any considerable extent in this county during the present year. The losses have been quite heavy.

Chautauqua.—A few horses, perhaps 200 head, have been lost in this county by an unknown fever. Grown cattle are affected with murrain and young ones with black-leg. Cholera and pneumonic fever are prevailing among hogs, and these diseases are proving quite fatal. A good many fowls are dying of a disease called cholera.

Clay.—Our stock is annually visited by one kind of disease and another, and sometimes our losses are very heavy. This year our losses among all classes of animals will aggregate from \$12,000 to \$15,000.

Cloud.—The only disease of an infectious or contagious character is that prevailing among swine, and generally known as hog-cholera. It is not so prevalent this year as formerly. The condition of all kinds of farm animals is from 25 to 50 per cent. better than in any previous years.

Crawford.—The principal disease among horses is lung fever, brought on for want of shelter and proper attention. Cholera prevails very extensively among fowls.

Davis.—Cattle are occasionally fatally affected with black-leg, and cholera prevails to a limited extent among hogs where many are kept together.

Elk.—Horses and cattle suffer from various diseases, and the losses will this year perhaps amount to \$7,000 or \$8,000. No epidemic has prevailed among hogs during the year, but a great many fowls have been lost by the usual disease.

Ford.—A disease called Texas fever prevails here among cattle. It hardly ever proves fatal to cattle brought from Texas, but when it attacks native cattle it is very severe, and generally fatal. A disease like cholera affects chickens, and seems to be contagious.

Franklin.—There are no diseases of any kind prevailing among farm stock in this county. Stock-raising of every kind is greatly on the increase here.

Jackson.—The prevailing disease among cattle is black-leg, and that is confined principally to calves and yearlings. Hogs are afflicted with cholera, but the disease is not so prevalent this season as usual. Chicken-cholera annually destroys a great many fowls. The condition of farm animals is fully an average.

Kingman.—Cattle are afflicted with wolf-tail and hollow-horn. Four out of every ten horses that are brought here from the East die before they become acclimated. Hogs and sheep are healthy.

Labette.—Spanish fever has prevailed among some cattle infected by stock brought in from Texas and the Indian Nation. Cholera has also prevailed to a limited extent among hogs.

Leavenworth.—Horses are rarely sick, but when they are attacked by disease they usually die. Hogs are afflicted with various diseases, and they nearly all die that are taken sick, as nobody tries to doctor them. Fowls also die rapidly.

Lincoln.—All classes of farm animals in this county have been exceedingly healthy during the past year. Stock is in very good condition.

Miami.—The only disease reported among farm animals is that existing among swine. This disease was very destructive last year.

Mitchell.—Murrain, black-leg, and lung-fever have prevailed to some extent among cattle during the past season, and cholera, quinsy, thumps, and fever among swine. A lamentable ignorance seems to prevail in regard to the nature and cause of disease among swine.

Nemaha.—No disease of consequence has prevailed among our stock this season. There has been some hog disease, and a greater loss than usual from diseases among fowls. In some instances parties have lost all they had.

Reno.—A number of horses in this locality have been sick with blind-staggers and glanders, and some have had a mild form of the epizootic. The first two diseases prove quite fatal, one of my neighbors having lost five animals, another three, and so on. Cattle are usually healthy. A few cases of black-leg, or something like it, have occurred. A disease is prevalent among hogs, which causes them to lose the use of their hind parts, and from which they die in about six weeks. Sheep are very healthy. Fowls are frequently seriously affected in the fall with cholera.

KENTUCKY.

Breathitt County.—A good many hogs have been lost this year by cholera, and many sheep with foot-rot. Horses are suffering with distemper, and cattle are frequently attacked with murrain.

Bullitt.—Cholera prevails to a considerable extent among hogs in this county. It seems to be more fatal among pigs and shoats than among older hogs.

Calloway.—Distemper prevails among horses, cholera among hogs and fowls, and rot among sheep. Cattle are healthy.

Carroll.—The disease known as hog-cholera is not so prevalent this year as usual. Many of our swine, however, have a delicate and unhealthy look, and do not improve fast even with the best treatment. This we regard as an evidence that the disease is hereditary.

Clay.—The so-called cholera among hogs has proved very disastrous to the farmers of this county during the past year.

Cumberland.—A few horses have died of distemper in this county. There are no infectious or contagious diseases prevalent among cattle. Hogs are afflicted with cholera, and a great many have died.

Estill.—The only diseases of consequence prevailing among cattle are hollow-horn and murrain. Horses are afflicted with distemper, and occasionally die of some kind of lung-fever. Hogs are badly afflicted with cholera. I should say from 80 to 90 per cent. of those attacked with the disease die. A good many hogs also suffer from thumps, and about two-thirds of them die. Cholera also prevails among fowls.

Fleming.—Horses are afflicted with distemper and lung diseases, from which about one in twenty die. The most destructive disease we have to contend with is cholera among hogs. At least one-fifth of all the hogs in this county annually die from this disease. Two years ago I lost one hundred and seven head, and this fall I have already lost sixty head more.

Hart.—Hogs, in some portions of the county, are more or less affected every year with cholera, but the loss this season is small compared with other years. Horses and cattle are free from all contagious diseases. Chickens suffer from various diseases.

Kenton.—There is but little stock raised in this county, and the only disease that has caused material loss to farmers is that among hogs.

Knox.—Hogs in this county have been seriously afflicted with cholera and blind-staggers. Murrain has also prevailed extensively among cattle, and distemper among horses.

Lewis.—This is one of the largest poultry-raising districts in the State. The loss by disease runs into the thousands. The shipments from this post are about one thousand chickens per week.

Martin.—The most prevalent and destructive disease among any class of farm animals is that of cholera among hogs. This disease is very fatal, and makes its appearance semi-annually. We have no remedy. Fowls also suffer with a disease generally known as cholera.

Ohio.—Hogs, as well as fowls, are still afflicted with cholera. The mortality among the former has been very large.

Oldham.—Distemper is the only disease afflicting cattle in this locality. Hog cholera prevails more or less all the time. Sheep are affected with various diseases, among others those of rot and scab. Fowls are suffering from cholera and roup. We have been unusually free from diseases of all kinds this year.

Pendleton.—Hog-cholera has not been so destructive this season as in previous years. The losses this year will, perhaps, not amount to over \$16,000 or \$18,000.

Rowan.—Hogs die in great numbers from cholera. There is no other infectious or contagious disease prevalent among the farm animals in this county. Fowls also die in great numbers from a disease generally called cholera.

Russell.—The disease commonly called hog-cholera has prevailed to a fearful extent in some portions of this county. The losses have been at least 75 per cent. of those attacked. Out of a herd of 75 head I lost 55. I hardly think the disease is contagious. So fearful has been the ravages of the disease that there will not be enough pork raised in the county to supply the home demand. Other classes of farm stock are in good health.

Shelby.—But few horses are raised in the county. The assessors report 9,588 head of cattle in the county. Owing to the ravages of hog-cholera there has been a falling off in the number of swine. Sheep husbandry is largely on the increase, and aggregates nearly double that of any previous year. At least 45,000 head have been placed on the farms of the county this fall for breeding purposes. No diseases of consequence, except hog-cholera, are prevalent.

Warren.—The losses have been quite heavy from diseases among hogs. Other classes of farm stock are healthy.

Whitley.—Distemper is quite prevalent among horses, and occasionally we have a case of murrain among cattle. Hog-cholera frequently prevails, and is often very fatal.

LOUISIANA.

Bienville County.—Horses here are subject to bots, colic, distemper, and blind-staggers. Perhaps 50 per cent. of the losses are occasioned by bots. The most common

disease among cattle is known as screw-worm or "wolf" (in the back), hollow-horn, and, occasionally, murrain. Hogs are subject to cholera and mange. The former is much the more fatal.

Claiborne.—Cholera among hogs is the most destructive disease now prevailing in this county. Domestic fowls are also dying rapidly from the effects of the same disease. We have recently lost some fine cattle, hogs, and mules by hydrophobia. They were bitten by mad dogs.

De Soto.—The only destructive disease among farm animals that we have to contend with here is a disease among swine, which kills about one-half of those attacked.

Jackson.—Horses frequently die here of blind-staggers and bots, and cattle of hollow-horn or head disease. A good many hogs are annually lost by cholera and thumps, and sheep with scab.

West Feliciana.—Charbon, which has prevailed in a mild form among horses and mules, and distemper among sheep, are the only affections among any class of farm animals. A few deaths have occurred among horses and mules, and many sheep have died of distemper.

MAINE.

Piscataquis County.—No infectious or contagious diseases prevail among farm stock in this county. About 10 per cent. of the fowls are annually carried off by disease.

Waldo.—The only contagious disease we have to contend with here is an epizootic distemper among horses, and this is fatal in but few cases.

York.—The usual number of diseases have prevailed among farm animals in this county during the past year, and the losses will amount to from \$10,000 to \$12,000.

MARYLAND.

Alleghany County.—Hogs have what we call cholera, and but few of those attacked recover. Fowls also have what we term cholera, and nearly all that are affected die.

Baltimore.—Lung fever has prevailed among cattle in the vicinity of Baltimore for the past twelve or fifteen years, and the losses have been considerable. Hog-cholera prevails in a few localities in the county, and a number of animals have died. The losses in fowls seem to be less than in former years.

Dorchester.—Hog-cholera prevails to a limited extent in this county.

Howard.—Some seasons the losses from hog-cholera are very heavy, and perhaps amount to as high as \$5,000. The annual losses from chicken-cholera will amount to that sum.

MICHIGAN.

Alpena County.—As this is a lumbering county a large number of horses and cattle (oxen) are used, but very few of them are raised here. A few milch cows and a few stock bulls, however, have been raised in the county. No disease has prevailed since the epizootic in horses.

Cass.—Distemper has prevailed among horses, milch fever among cattle, and so-called cholera among swine and fowls.

Chippewa.—This is a new county and we have but little stock as yet, and it is entirely healthy. Grass is grand for dairy cattle. It is always green and nutritious. All animals that run at large in the summer are rolling fat in the fall.

Clinton.—Farm animals in this locality are free from all infectious or contagious diseases.

Delta.—This is comparatively a new county, and what little stock it contains is in a healthy and thriving condition.

Emmett.—A few horses have been affected with colds and a discharge from the nose, but none have died.

Houghton.—Diseases among hogs have prevailed here for three years. Some have died suddenly when in apparent health and in good condition. A number of cattle are affected with cancer or worm in the tail.

Huron.—Distemper prevails among horses, but the disease seldom proves fatal. All other farm animals are free from infectious and contagious diseases.

Kalamazoo.—No disease has prevailed this year among farm animals except cholera among swine. This disease has prevailed to a limited extent this fall.

Kenil.—There have been no infectious or contagious diseases prevalent among farm animals during the past year.

Manistee.—The general condition of farm animals in this county is good, and rather above the average.

Muskegon.—The proportion of farm animals that are attacked and die with infectious and contagious diseases in this county is very small. Of horses perhaps 1 per cent. are lost; of sheep, one-half of 1 per cent. I hear of no losses among cattle and hogs. Of fowls perhaps 5 per cent. die annually of disease.

Oakland.—One year ago the disease known as hog-cholera created a good deal of un-

easiness, but the low price of pork has caused the "thinning out" to such an extent that we now hear but little complaint. The losses this year will perhaps amount to \$9,000 or \$10,000.

Otsego.—Several hogs have been lost by the farmers in this county during the past year from some disease thought to be contagious. All other classes of stock are healthy.

Presque Isle.—Horses, hogs, and fowls in this locality are measurably healthy, but calves seem to be affected with a contagious disease.

Saginaw.—About 1 per cent. of the cattle and hogs raised in this county annually die of disease. As a rule all our stock is housed in the winter and comfortably cared for.

Saint Clair.—Several horses have died in this county during the present year of contagious diseases. Cholera prevails among swine in one locality, but has not appeared in a very malignant form.

MINNESOTA.

Beltrami County.—The only disease prevalent among any class of farm animals is distemper among horses. This is an Indian agency, and there are but few animals in the county.

Faribault.—A few cattle die annually in this county of a disease known as black-leg, and a few sheep with the scab. Other classes of farm stock are healthy.

Houston.—The only disease among our stock that we have had to contend with the past season has been the so-called cholera among hogs.

Isanti.—Cattle in this county are frequently attacked with black murrain, and a disease that causes a rising and running sore on the head. There is no remedy known for the latter disease, and when an animal is attacked by it, it is generally killed. Hogs are subject to cholera and a disease called staggers, both of which are very fatal.

Lac-qui-parle.—Black-leg is quite prevalent among cattle, but is principally confined to young animals. All die that are attacked with the disease. The general condition of farm animals is above the average.

Martin.—A few horses die annually in this county from epizootic, and perhaps 5 per cent. of the cattle from black-leg. Stock generally is in good health and condition.

Nicollet.—Glanders prevails among horses in this county, and is the only contagious disease with which these animals are afflicted. Quite a number of cattle died of black-leg during the past spring, and about one hundred more from the effects of eating smutted corn.

Olsted.—No diseases prevail among any classes of farm animals in this county that I am aware of. In some localities cholera exists among chickens.

Pope.—Epizootic has prevailed among horses, of late, with some fatal cases. Cattle have been suffering more or less with black-leg, which is fatal, with but few exceptions. Hogs and sheep have been healthy, so far as I can learn.

Rice.—All classes of domesticated animals in this county are in good health. I have not heard of the prevalence of any infectious or contagious diseases during the year.

Rock.—There has never been a marked case of any infectious or contagious disease among farm stock in this county. There yet lingers some traces of epizootic distemper in horses, but few, if any, deaths have occurred from that cause this year.

Saint Louis.—Our farm animals are remarkably free from all infectious or contagious diseases. The diseases peculiar to fowls are roup, &c., much of which is due to in-breeding.

Scott.—Recently there has appeared among horses here an epidemic or endemic disease somewhat akin to the epizootic of some years ago. The first symptom is a mucus discharge from the nose, culminating in ten or twelve days in an affection of the kidneys. After having reached this stage the disease generally proves fatal. If taken in time the patient can be cured.

Swift.—The only disease of a serious character that has visited any of the farm animals in this county, during the past year, is black-leg among cattle.

Yellow Medicine.—A few horses in this county have been afflicted with distemper, but none have died. No other contagious disease is prevalent, and all classes of farm stock are healthy.

MISSISSIPPI.

Calhoun County.—In this county, horses and cattle are rarely if ever affected with infectious and contagious diseases. Hogs are frequently afflicted with cholera, and the estimate given (\$7,500) is hardly high enough during a year of its general prevalence. Sheep are hardly ever afflicted with any disease save rot. Fowls of every breed occasionally have cholera, and when it attacks a flock it generally kills them all.

Choctaw.—Cattle suffer with charbon, horn-ail, and murrain, and hogs frequently die of cholera or swine-pox. Sometimes a farmer loses nearly all his hogs by these maladies.

Covington.—Owing to the extremely hot weather during the summer we lost at least 20 per cent. of our farm horses by staggers. All ages were affected alike. At this time all classes of farm animals are in fine condition.

Franklin.—The number of hogs affected with diseases during the past summer was greater than usual, and at least 50 per cent. of those affected died. Other animals have remained healthy.

Holmes.—A good many colts die in this county every year from distemper. Hogs die in great numbers of cholera, lung fever, and quinsy. Fowls are subject to cholera and roup, and frequently one-half of them are lost by these diseases.

Leake.—From the most reliable information I am able to obtain, I am led to believe that about 8,000 hogs were lost in this county during the past season, a large majority of which died of cholera.

Lee.—A very destructive disease prevails among fowls in this locality. It made its appearance here four or five years ago, and has continued with more or less virulence ever since. It frequently sweeps off whole flocks. I myself have this year lost 300 game fowls. It is not cholera, but a disease more resembling paralysis. They are taken very suddenly, lose the use of their limbs, fall down and flutter until they die, which is generally within from twelve to forty-eight hours. If they linger beyond that length of time they are apt to recover. The disease is singularly sudden and fatal, and causes a heavy loss to the people of this locality.

Lowndes.—Since the prevalence of the epizootic some years ago no contagious disease has prevailed among horses in this locality. Murrain is the most fatal disease we have among cattle, and it annually proves very destructive. The losses among hogs from a disease called cholera are very heavy. Fowls also die oftener of cholera than of any other disease.

Marshall.—The usual diseases prevail among all classes of farm animals, and the aggregate losses this year will perhaps amount to from \$8,000 to \$10,000.

Noxubee.—All classes of farm animals, with the exception of hogs, have been free from disease this year. The losses among swine have been very heavy, and will perhaps aggregate \$10,000. Pastures were quite good throughout the summer, but very little cattle feed has been housed, and a spring report will no doubt tell a tale of starvation, &c.

Prentiss.—A few cases of hog-cholera have been reported in the county, but the disease has not been very destructive.

Rankin.—Charbon and blind-staggers occasionally prevail among horses, and various fatal diseases among hogs.

Scott.—The only diseases of any consequence that have occurred among farm animals in this county during the past year have been among swine. Between one and two thousand head have died.

Tippah.—Last year a number of hogs died here from a swelling of the head. The head would swell until the skin would break, and the hog would bleed to death in a few hours. I cured a cow recently of murrain by giving her kerosene oil, lard oil, and epsom salts, in doses a few hours apart.

Tishomingo.—Diseases of a mild type have prevailed among all classes of farm animals during the past year. The losses have been light.

Wilkinson.—Hogs in this county frequently suffer and die of pneumonia and congested liver, as do also fowls.

Yazoo.—A great many horses die annually in this county from a disease called big-head or big-jaw—an enlargement and softening of the bones. It is caused by feeding corn exclusively. Hogs annually suffer severely with cholera.

MISSOURI.

Andrew County.—This year has been remarkably favorable to all kinds of farm stock. I have heard of no infectious or contagious diseases among any class except hogs.

Barton.—The losses among horses, cattle, and hogs from disease will probably amount to \$10,000 or \$12,000 for the present year. Diseases have not been so prevalent among farm animals during the past season as usual.

Benton.—All classes of farm animals, with the exception of hogs, have remained healthy during the past year.

Buchanan.—Horses, cattle, and sheep are free from serious diseases, but cholera exists among both hogs and fowls. With my own hogs I noticed that all those that had diarrhea recovered. The most of those afflicted were costive and had high fever. Cattle are frequently attacked with hoven, caused by eating white clover.

Clay.—Heavy losses have been sustained by the farmers of this county during the past year in the loss of hogs, sheep, and fowls by various contagious and malignant diseases. Horses and cattle have remained healthy.

Franklin.—The so-called hog-cholera has not been so prevalent and wide-spread in this county the past season as during previous years.

Henry.—No epidemic has prevailed among horses here for several years past. Texas

fever among cattle has prevailed to a limited extent, but only when parties here violated quarantine laws regarding it. Hog-cholera has prevailed extensively, and the estimated loss is put at lowest figures \$20,000 annually.

Hickory.—Hog-cholera has prevailed to some extent in this county during the past year, but the losses have not been as heavy as usual.

Jasper.—Hogs and fowls are afflicted with cholera, and cattle with a disease generally known as murrain.

Laurence.—Black-leg prevails to a considerable extent, and is very fatal among calves and yearlings. There is also some murrain among older cattle. Cholera (so called) is quite prevalent among hogs, but the greatest fatality seems to be among pigs and shoats. I do not think one hog out of a thousand, however, dies of cholera. The disease is more like lung fever or congestion of the lungs, and has been very destructive the past year, especially among young stock.

Lewis.—I have heard of no infectious or contagious diseases among domesticated animals in this county, except among hogs. The diseases which affect hogs are manifested by various symptoms. The annual losses are very heavy. We have no remedy, but generally separate the sick from the well hogs immediately on discovering that they are sick.

Marion.—The disease prevailing among swine and poultry in this locality is commonly called cholera, and that among horses and sheep is designated as distemper.

Miller.—Hogs and fowls in this county are dying at a rapid rate of a disease commonly known as cholera. All other kinds of farm stock are healthy.

Mississippi.—A few cases of blind-staggers among horses and murrain among cattle have occurred. Cholera prevails among swine, but it is impossible to give the amount of annual losses.

New Madrid.—The diseases most prevalent here among farm stock are cholera among hogs and fowls, distemper among horses and mules, murrain and hollow-horn among cattle, and rot among sheep.

Nodaway.—A contagious distemper prevails among horses, but it is not of a very fatal character. Black-leg and Texas fever have been very destructive to cattle. Hog-cholera also prevails and seems to be much more fatal to pigs than to older animals. Sheep are to a limited extent afflicted with scab and grub in the head.

Pettis.—Cholera and lung diseases have prevailed among hogs during the past year, and have been very fatal. Fowls have also suffered considerably with what we term cholera.

Phelps.—A few horses have died of distemper, and some cattle of Texas fever and murrain. A heavy loss has been sustained by the farmers of the county from diseases among swine.

Pike.—Hog-cholera is the only disease that has prevailed among any class of farm animals in this county during the past year. The losses will amount to from \$12,000 to \$15,000.

Platte.—There is but little demand for horses here, hence stock-raisers have turned their attention to raising cattle. They find them more profitable and less liable to disease, and ready for market at a much earlier age. When cattle are well cared for we lose but few by disease. The most skillful farmer, with the assistance of our best physicians, have completely failed to find a remedy for diseases of hogs. All die that are attacked, and the same can be said of fowls that are attacked by disease. But few sheep are raised in this county.

Polk.—Cattle are affected to a limited extent with Texas fever and black-leg. Other classes of farm stock are healthy, with the exception of hogs, and a good many of these have been lost by the various diseases incident to them.

Putnam.—The class of animals mostly affected with disease in this county is hogs, a great many of which die of a disease generally known as cholera. The remedies used, as a rule, I do not think amount to much. The general condition of farm animals is better than last year.

Shelby.—Horses, cattle, and sheep are very healthy, but our hogs die at a fearful rate with a disease commonly called cholera. It prevails at almost all seasons of the year, but with more virulence during some months than in others. Sometimes it will kill nine-tenths of all the hogs in a herd, at others perhaps one-half, and at still others but a few will die. We do not know what causes the disease, nor have we a remedy for it. Chicken-cholera also prevails to a fearful extent, and sometimes carries off as high as nine-tenths of the crop. The general condition of farm stock, aside from hogs, is good.

Stoddard.—Our principal losses are from cholera among swine and fowls. Horses, cattle, and sheep are moderately free from diseases.

Stone.—The so-called hog-cholera is more fatal this season than usual. The losses up to this time are estimated at from \$40,000 to \$50,000.

Worth.—All farm animals except hogs are free from disease. These animals are afflicted with cholera. Chickens also occasionally suffer from cholera.

Wright.—No disease of any moment exists among farm stock in this county. Last year about one-third the hogs in this county died of cholera.

MONTANA TERRITORY.

Lewis and Clarke County.—Stock of all kinds in this county are comparatively healthy. A few sheep introduced from Oregon show the scab to some extent.

NEBRASKA.

Cass County.—The only diseases among farm animals in this county are confined to swine. The losses are not very heavy.

Cedar.—Many cattle die in this county during the month of November from a disease contracted by feeding on corn-stalks, but the disease does not seem to be infectious or contagious.

Clay.—Deaths frequently occur among horses from colic, fevers, and inflammatory affections. Cattle are affected with murrain and black-leg. There is no cholera at present among hogs, but there has been a loss of about 600 head of sheep in the county during the past year from diseases incident to this class of stock. Many fowls, especially young chicks, die of rouse and gapes.

Cuming.—There are a few cases of epizootic and distemper among horses, but the diseases are of a mild type, and but few animals have been lost. Black-leg is about the only malady among cattle. Hog-cholera prevails to a greater or less extent every year.

Dakota.—From ten to fifty head of horses annually die in this county, supposed to be from the effects of alkali. About one hundred yearling calves die annually of a disease called black-leg. We occasionally lose hogs by cholera, but the disease is not prevalent this year. Fowls also frequently die of cholera.

Furnas.—We have a new disease among cattle here that has killed a great many in the past two weeks. They are attacked by a twitching and jerking of the nerves of the whole body, bloat a little, are in great pain and agony, and die within from six to fifteen hours. I examined four animals to-day, and found two with the galls bursted, another very large, and a fourth blood-shotten. The cattle thus attacked have been running in corn-fields after the corn had been harvested. The disease is new to us, and we do not understand it.

Greeley.—A good many horses die annually in this county, but in almost every case the loss can be traced to exposure and ill treatment.

Knox.—Black-leg prevails extensively among calves and is very fatal. There are no diseases prevalent among other classes of farm animals.

Merrick.—But little disease prevails among domesticated animals in this county. Perhaps \$3,000 or \$4,000 will cover the annual losses for all classes.

Nuckolls.—A very bad distemper prevails among horses in this county. There is also prevalent a mild form of epizootic which few horses escape. Cholera also prevails among hogs.

Pawnee.—Cholera has prevailed to a fearful extent among hogs in this county during the past season, and the losses, in value, will exceed \$10,000.

Platte.—Young cattle frequently die within a few hours after being attacked with a disease supposed to be caused by eating smut found on the stalks of corn. A good many hogs have died from that pest of the farmer, the cholera, but at present the disease seems to be confined to one locality in the county.

Red Willow.—While this is a remarkably healthy climate for farm stock, a good many cattle and sheep annually die from diseases incident to these animals.

Richardson.—The disease commonly known as cholera has carried off a great many hogs in this locality during the past season.

Saline.—This is a new county, and what few farm animals we have are in a very healthy condition.

Sarpy.—Black leg is quite prevalent and destructive among calves. There seems to be more cases this fall than usual. Hogs are affected with a lung disease, which made its appearance here last year. The disease is chiefly confined to pigs from three to six months old. At least 10 per cent. of those attacked die.

Saunders.—The only diseases prevalent among horses are glanders and distemper, or quinsy. Some six head of horses have died of these diseases. The increase in the production of hogs is 7,543. Of this number 33 per cent. were affected with cholera, and one-third of them died. The only disease among sheep is foot-rot.

Valley.—This is a new county, and what little stock we have is healthy, and free from all infections and contagious diseases.

Wayne.—No disease of any consequence has prevailed among farm animals in this county since the epizootic some years ago.

Webster.—The farm animals in this county are entirely free from all diseases of an infectious and miasmatic character.

York.—Some hog-cholera prevails in this county, also cholera among chickens. Horses and cattle are healthy.

NEVADA.

Nye County.—All kinds of stock range our mountains and plains, and are only gathered in once a year to corral. No diseases of an infectious or contagious character prevail among them at present. All losses occur from starvation and exposure in winter.

NEW JERSEY.

Burlington County.—The prevailing disease among cattle in this county is pleuropneumonia. It is very fatal, and the losses in this class of animals have been very heavy. Hog-cholera is prevailing extensively and in a very fatal form. The same might be said of diseases among fowls. The losses among all classes of farm animals will annually amount to over \$100,000.

Camden.—There are no diseases prevalent among horses, except those peculiar to colts and young horses. These are generally of a mild character. Hog-cholera prevails to some extent; so does cholera among fowls.

Cape May.—During the past year horses have suffered severely from a disease called blind staggers. A good many animals have been lost. Hog-cholera prevails to a limited extent.

Middlesex.—A contagious lung fever prevails among cattle in this county, but it has not as yet appeared in a very malignant form.

NEW MEXICO TERRITORY.

Colfax County.—Scarcely any disease is prevalent among domesticated animals in this county save scab among sheep. The losses among this class of stock perhaps amount to 1 per cent. of the whole number raised. There is scarcely any infectious or contagious disease among our larger farm animals.

Dona Ana.—A few flocks of sheep, of improved variety, have scab in a mild form. Hogs and fowls are free from cholera. Occasionally a cow is lost by hoven, brought on by eating green alfalfa; and I lost two merino rams the past summer from the same cause. I also lost two Angora bucks from an unknown disease.

San Miguel.—There are about 100,000 sheep annually raised in this county, and about 1 per cent. of them die of an affection of the milt.

Taos.—Horses are generally affected with epizootic distemper and cattle with Texas fever. A great many die in the spring of the year from the effects of eating poison-weed. Hogs, sheep, and fowls are generally healthy.

NEW YORK.

Allegany County.—Our horses are frequently attacked with strangles or distemper, a disease which is believed to be contagious. A few cows are annually lost from milk fever, and a limited number of calves die of murrain. Sheep are affected with foot-rot, and many fowls die of cholera.

Chenango.—I have heard of a few calves dying of worm in the lungs, which seems to be a new disease in this county. A farmer who lost three examined the lungs and found large quantities of worms about an inch long and the size of an ordinary thread. I lost a few calves by the disease known as black-leg, and on opening the lungs found a few worms.

Fulton.—Owing to abundant feed, stock of all kinds is in fine condition this fall.

Genesee.—The value of farm stock lost by various diseases during the past year in this county will amount to from \$20,000 to \$25,000. The heaviest losses have occurred among horses and swine.

Montgomery.—A great many cows suffer annually from abortion; and the loss by accident and the various inflammatory and congestive diseases will average one cow for every dairy of thirty-five cows. No contagious disease prevails in any of our flocks or herds.

Niagara.—Light diseases, with but few fatal results, have prevailed among swine during the past season. Other classes of stock have remained healthy.

Seneca.—All classes of farm animals in this county have been unusually healthy during the past year.

NORTH CAROLINA.

Allegany County.—We have no diseases among either horses, cattle, or hogs. Sheep occasionally die from distemper and a disease called rot. Young chicks frequently die of gapes.

Brunswick.—On consultation with the best informed persons in the county I do not find that any diseases have prevailed among farm animals during the past year.

Large numbers of fowls have died, but it is impossible to estimate the number or give any name to the disease.

Cherokee.—There are no diseases of a contagious character prevalent among the farm animals of this county. There have been some losses of young chickens and turkeys by gapes, but I do not think this disease is contagious.

Cumberland.—The loss of hogs from the various diseases to which they are incident, but all of which are called cholera, has been very great. A great many fowls have also died from a disease generally known as cholera.

Currituck.—The only disease of any consequence that we have had to contend with among the farm stock in this county has been that commonly known as cholera among swine. The loss so far has been quite heavy.

Halifax.—All classes of farm stock have been more free from disease this year than any year during the past ten.

Haywood.—Hog-cholera prevails to a greater or less extent every year and kills a great many animals of all sizes, but is more fatal among pigs. Chicken-cholera is also quite prevalent and fatal. Stock generally is in better condition.

Henderson.—A large number of both cattle and hogs have been lost during the past year; perhaps the aggregate for these two classes alone will amount to \$18,000 or \$20,000.

Hertford.—Horses and mules are affected with but one contagious disease—that of glanders or farcy. All that are attacked die. Thousands of hogs die annually of disease, but whether it is contagious or not we have not determined. Cholera is generally prevalent and very destructive among fowls.

Jackson.—Infectious and contagious diseases among horses, cattle, and sheep are almost unknown in this county. Last year nearly all the hogs in the county died of disease, but during the previous five years but few were attacked.

Madison.—The only class of animals affected by disease during the past year has been that of swine. Cholera has been quite prevalent and fatal among fowls in some localities.

Mitchell.—Large numbers of hogs and fowls are annually lost in this county by a disease commonly called cholera.

Orange.—Some four or five thousand hogs have been lost by disease in this county during the current year. A few horses and cattle have also died from diseases peculiar to these classes of farm animals.

Pamlico.—The most prevalent and fatal disease we have to contend with is that of cholera among hogs and fowls. The disease annually carries off numbers of both hogs and domestic fowls. The condition and quality of farm animals is better than for years past and is gradually and surely improving.

Perquimans.—Hogs are much diseased in this county and are very cheap. Young pigs attacked with cholera seldom recover.

Person.—The prevailing disease among farm animals here is that of cholera among hogs, which is very destructive. Trichinae destroy many of the pigs and shoats. Sheep are healthy, but a great many fowls die of cholera. The goose and peafowl are the only species of domestic fowls that do not suffer with it.

Robeson.—Hogs in this county are more affected by disease than any other class of animals. Cholera is the prevailing disease among them, and for which we have no remedy. The general condition of farm animals is 50 per cent. better than for previous years.

Sampson.—No epidemic has visited horses, mules, cattle, or sheep so far as I have been able to learn. At least one-third of the hogs of the county die every year from a disease known as cholera. If any recover they are of no value, as the disease either leaves them deaf, blind, or afflicted in some other way. Fowls die in about the same proportion from a disease of like character.

Transylvania.—We have no contagious diseases among cattle. Our losses are occasioned by exposure and want of feed during winter. No unusual disease is prevalent among any class of farm animals.

Wake.—Horses, cattle, and sheep are free from infectious and contagious diseases. Hogs suffer a good deal from cholera and lung diseases. When these diseases appear in a herd there seems to be no cessation until the last animal is destroyed. Fowls are subject to all sorts of diseases, and frequently the mortality among them is very great.

Wilkes.—We have some distemper among cattle, but are at a loss to know what causes it. It seems to prevail mostly where the people have the typhoid fever. Cholera is the prevailing disease among hogs and chickens. It has been very destructive during the past summer.

Yadkin.—Hog and chicken cholera has prevailed here for several years past. When the disease gets among a class of fowls it kills nearly all of them.

Yancey.—Distemper prevails among horses and sheep, and murrain and hollow-horn among cattle. Hogs have been seriously affected with cholera and some kind of fever; a good many fowls are also lost by cholera. The condition of all kinds of farm stock is better than usual at this season of the year.

OHIO.

Ashland County.—We have no infectious or contagious diseases among domesticated animals in this county. There are a few sporadic cases of disease and death, but the aggregate loss is very small. About one farmer out of every twenty-five loses his chickens every year by cholera.

Athens.—The so-called cholera prevails among hogs and fowls in this county. I believe the greatest number of deaths among cattle have occurred among cows, which have died of milk fever. The disease shows itself from the first to the third day after calving, and generally attacks the animal after the fourth calving. Select breeds and good milkers, and those in good condition, are generally the ones that suffer. The symptoms are loss of appetite, staggering gait, wild look, and cessation of rumination; they fall down and cannot rise; the brain seems to be affected; the animal will dash about, striking her head and horns against the ground, when she soon dies. We have no remedy.

Auglaize.—Hogs seem to be the only farm animals seriously affected with disease. They suffer with the disease generally known as cholera. The losses so far this year will amount in value to from \$25,000 to \$30,000.

Brown.—A few colts are lost in this county by distemper, and a good many hogs and fowls annually die of a disease commonly called cholera. Sheep die of grub in the head and of neglect while young.

Erie.—There is no special disease prevailing among the farm animals in this county.

Fairfield.—With the exception of swine the live stock of this county has been comparatively free from disease during the past year. Swine have suffered with cholera, though not so extensively as in former years.

Franklin.—Large numbers of hogs and fowls have died in this county during the past year of the various diseases common to them.

Gallia.—Hog-cholera prevails to some extent in this county, but in a rather mild form this season. Chicken-cholera is quite prevalent and malignant, and the losses are heavy.

Geauga.—No disease of consequence exists among any class of farm animals in this county. The general condition of farm stock is good.

Guernsey.—The prevalent diseases among horses are those affecting the lungs, principally lung-fevers. Hogs are affected with cholera and cattle with murrain.

Hardin.—Hog-cholera has prevailed to a limited extent in the northern part of the county, but in this locality we have not suffered from the disease this year.

Jefferson.—No diseases of a malignant character have prevailed among farm animals in this county during the past year. Owing to abundant pasturage farm stock is in very high condition.

Knox.—There is no disease among farm animals here. Chicken-cholera prevails every year and carries off a great many fowls.

Meigs.—There have been few, if any, deaths among farm animals in this county during the present year, except from natural causes. During the past eight or ten years chicken-cholera has prevailed from time to time, and is prevalent in some localities at this writing.

Mercer.—The so-called cholera still prevails among hogs in some localities in this county. Cholera among fowls is also prevalent, but the disease is not so fatal as formerly.

Miami.—But little disease exists among farm animals in this county aside from the so-called cholera among hogs. The loss among this class of animals is, in some years, very heavy.

Monroe.—No infectious or contagious disease has prevailed among farm animals in this county during the past year.

Montgomery.—Chicken cholera has prevailed as an epidemic during the past season, and many fowls have been lost. Cholera among hogs has also been very destructive.

Ottawa.—The only disease prevailing among any class of farm animals is a disease among hogs, and this is confined to two townships of the county. The animals have a diarrhea, vomit, and wheeze as one afflicted with asthma. They die very suddenly.

Paulding.—The mortality among horses has been unusually large in this county during the past year. The same can be said of cattle. During the two years hog-cholera has been very extensive and fatal. Fowls are also subject to cholera.

Richland.—It is estimated that the product of chickens in this county will aggregate 150,000 per annum, and that 25 per cent. of these die of cholera. Several diseases annually prevail among farm animals, and frequently the losses are very heavy.

Summit.—Several fatal diseases are prevalent among horses, among others inflammation of the lungs and bowels, and distemper or epizootic. Cattle are afflicted with hollow-horn and murrain. The prevalent diseases among hogs are cholera and blind staggers. But few of these animals recover. Consumption carries off a good many sheep, and cholera is very destructive among fowls.

Trumbull.—The production of farm animals in this county has decreased in the past

four or five years, but stock of all kinds has improved in quality. No infectious or contagious diseases are prevailing.

Tuscarawas.—No epidemic disease has recently prevailed among farm animals in this county, but a good many domesticated animals have been lost during the year by the various maladies incident to this class of property.

Wood.—Horses and cattle have been free from infectious and contagious diseases during the past year. Hogs and chickens have suffered severely from a disease commonly known as hog and chicken cholera. The losses among hogs have been very, as some farmers have lost entire herds. Sheep have healthy.

Wyandot.—Cholera has prevailed among hogs to a limited extent in this county the past season. Cholera has seriously affected the fowls, in some cases sweeping off whole flocks.

OREGON.

Clackamas County.—No disease among horses. A good many cattle die annually for want of proper attention. A few hogs die every year from liver-disease.

Linn.—Horses here are suffering to a limited extent with contagious distemper; cattle are healthy, but sheep are subject to scab and other diseases.

Polk.—Cattle, hogs, sheep, and fowls are afflicted with the usual diseases, though the losses are never very heavy.

Tillamook.—There are no diseases of a contagious nature prevailing among the farm animals in this county.

PENNSYLVANIA.

Armstrong County.—Cholera prevails to some extent among hogs in the eastern part of the county. One man recently lost twenty head by this disease. Chicken-cholera also prevails, and is fatal in most cases. A good many sheep annually die of foot-rot and grub in the head.

Blair.—Distemper and lung-fever prevail among horses, and cholera among hogs and chickens. Foot-rot also seriously affects sheep where not properly treated and cared for.

Erie.—No special diseases have prevailed among farm animals in this locality for some years, and hence the losses have been comparatively light.

Lycoming.—There have been no infectious or contagious diseases among farm animals in this county the past year.

McKean.—The condition of farm animals is good compared with previous years. Horses are overworked in the oil regions, and many die from abuse and lack of proper attention.

Northampton.—There has been no contagious diseases among farm animals in this county so far as I have been able to ascertain.

Perry.—Losses among horses and cattle from various diseases will perhaps reach \$3,000 annually in this county. Losses among hogs, when no epidemic disease prevails, will probably amount to \$800 or \$1,000 per annum. Some years cholera is very destructive among chickens, so much so as to kill about all in some localities.

Wayne.—But few horses are lost here by contagious diseases. A good many young pigs and chickens die of cholera.

SOUTH CAROLINA.

Barnwell County.—The only disease known among horses in this county is staggers or blind staggers. We know nothing about the pathology of the disease and have no remedy. Ninety-nine animals out of a hundred that are afflicted with the disease die. Occasionally our hogs are afflicted with cholera. Sometimes one farmer will lose two-thirds of his entire stock of hogs while his next-door neighbor will lose none. Fowls die by the hundreds when closely confined in coops that have remained on the same ground for a number of years.

Colleton.—Many hogs are annually lost in this county by a disease generally known as hog-cholera. Great numbers of fowls also die of a disease called cholera.

Lexington.—Hogs have suffered less this than last year from cholera. The losses last year were frightful. Fowls have this year suffered beyond all precedent from so-called cholera. I had a fine lot of 100 Bramahs, from which I had 150 dozen eggs during the early spring. As warm weather came on they were attacked and nearly all died—only one of those attacked survived. Unless something can be done to prevent the annual recurrence of this fatal epidemic, we will have to stop trying to raise fowls.

Oconee.—We have no infectious or contagious diseases among either horses, cattle, or sheep. In a few localities of the county hogs have suffered from cholera. There are a few localities along the Blue Ridge range of mountains where the cattle greatly suffer from milk sickness. An appropriation by Congress for the discovery of the cause of this disease would be eminently proper.

Orangeburgh.—Hog-cholera has prevailed this year in some localities in this county.
Pickens.—The diseases common to cattle are distemper, murrain, and milk-sick. Distemper is regarded as contagious, and a similar disease prevails among horses. The prevailing diseases among hogs is commonly called cholera, and it nearly always proves fatal.

TENNESSEE.

Bedford County.—There is no disease here among cattle except murrain, which was brought in from other States and seems to be contagious. The most fatal disease among hogs is cholera, for which we have no remedy.

Benton.—Horses, cattle, sheep, and fowls are affected with the usual diseases. We have had no hog-cholera this year. This disease usually kills nearly all the hogs in this section about once in every three or four years.

Bradley.—All kinds of domestic animals are exceedingly healthy in this county.

Blount.—Horses and mules suffer from distemper, epizootic, and glanders; cattle from murrain and sore tongue; hogs from cholera and quinsy; sheep from rot; and fowls from cholera. These diseases prove fatal in many cases.

Dyer.—Horses, cattle, and sheep in this county suffer very little from disease of any kind. Hogs and chickens frequently suffer terribly from the ravages of cholera. The disease seems to be infectious or contagious with both classes, and is very fatal, as but few of either class recover. The malady is not at all understood, and no remedy that amounts to much has as yet been discovered.

Fentress.—There are but few horses in this mountainous county, but cattle are plentiful. Hogs could be raised here in great abundance were it not for the ravages of the disease known as cholera. Fowls frequently die of gapes.

Hamblen.—Several horses have died during the past season with blind staggers or brain fever. The condition of farm animals is better than usual.

Hardeman.—There were some losses of horses and cattle last spring from starvation and bad treatment. We have suffered greater losses, however, from diseases among hogs than of any other class of farm animals. The disease is called cholera by some, and by others red mange, and by still others measles. The hog at first presents a mangy appearance; afterwards it breaks out in pimples or sores, and soon dies. A black hog of mine which recovered from the disease is now gray.

Hardin.—Milch-cows and oxen have suffered severely during the past season from murrain. Cholera prevails among swine of all ages.

Henderson.—Blind staggers is about the only disease that proves destructive among horses. Every disease incident to the hog is called cholera, and diseases are more prevalent among swine than among any other class of animals. Rot prevails among sheep, and cholera among fowls.

Jackson.—The great bulk of the annual losses of hogs in this county occurs from a disease known as cholera. Fowls die of a similar disease.

Macon.—Cholera is the only disease that affects hogs in this county. The disease has been quite prevalent and fatal during the year. Chickens also die of cholera.

Marion.—Horses are subject to distemper and blind staggers, from which many of them die. Cholera prevails among our hogs, and has proved very fatal. During some years almost all the fowls die of cholera. All kinds of stock suffer for want of proper attention.

Monroe.—There are from two to three thousand horses annually raised in this county. There is but little disease among this class of animals—nothing worse than common distemper, and an occasional case of bots or colic. About five thousand cattle are annually raised, and they are seldom affected with disease. Formerly hog-cholera prevailed extensively, and the fatality was very great, but of late years the disease has been very mild and has not prevailed as an epidemic. But little interest is taken in sheep. Fowls are raised by almost every family, and have become an important matter of trade among the ladies of the county in buying little items in stores.

Morgan.—Diseases in various forms have prevailed extensively among our hogs and fowls for years past. They have not been so prevalent during the past year.

Obion.—Horses, cattle, and sheep are remarkably healthy. Cholera exists among hogs, and a good many animals have been lost, but the disease is not very extensive this season. Cholera also prevails among fowls in some localities.

Overton.—Our cattle do not often suffer from contagious diseases, but many of them die for want of proper care and attention. Hogs and fowls suffer from cholera, and sheep from rot.

Perry.—The loss of hogs from cholera in this county during the past year will amount to not less than \$12,000. Sheep have been affected with rot, and a good many fowls have died with cholera.

Squatchie.—Swine are affected with what seems to be diseases of a local character. Many of these diseases are no doubt brought on by careless treatment.

Serier.—But little disease has prevailed among farm animals in this county during

the past year. A good many hogs have been lost, but the diseases among them have not been so widespread as in former years.

Van Buren.—The disease among hogs in this county is generally called cholera, although it manifests varied symptoms. Chickens are also affected by a disease designated as cholera.

Weakley.—With the exception of slight affections among hogs and chickens, all classes of farm animals have been unusually healthy during the past year.

TEXAS.

Austin County.—The losses of horses by infectious and contagious diseases varies greatly, but for the last two years they have been unusually large. The losses have been heaviest among stock horses on the prairie, and the disease affecting them seems to be a distemper or kind of crump. A strange disease has been prevailing among cattle in the northern part of the county, and every animal attacked has died. The diseases among hogs are cholera, lung affections, measles, inflammations of the throat, &c. Most of the animals attacked die. Cholera prevails among chickens, and losses have been very heavy.

Bandera.—All classes of domesticated animals have been unusually free from disease during the past year. Fowls are afflicted with various diseases, some of which are very fatal.

Bezar.—A few diseases annually prevail among domesticated animals in this county, and the annual losses among all classes will probably aggregate from \$8,000 to \$10,000.

Camp.—Stock generally is in good condition in this county. I have heard of no diseases prevailing among any class of farm animals.

Comal.—The only disease among horses consists in a swelling of the glands of the throat, frequently ending in ulceration. The disease prevails more extensively in spring when the weather is cold and wet. The majority of the animals that die are colts. The affection seems to be an epidemic, produced by scanty pasturage and rough weather. There are no contagious diseases prevalent among cattle, hogs, or sheep.

De Witt.—Horses, cattle, hogs, and sheep are generally healthy and in good condition in this county. The losses are so small as to attract but little or no attention. Fowls frequently die of a disease known as cholera.

Eastland.—A good many horses die in this county of blind staggers and big head, caused principally by feeding unsound corn. Diseases among cattle are not so fatal this season as they were last year. We have no special diseases among hogs, but a great many of them have died this year for lack of feed. Foot-rot and scab prevail among sheep. Fowls die of various maladies.

Harrison.—A few number of horses have died from disease in this county during the past twelve months than for several years past. Our hogs die in considerable numbers from a wheezing disease caused, no doubt, by eating cotton-seed, picking them up from about our gin-houses, or where they have been dropped by cattle. Our chickens and turkeys have died by the thousands with a disease we call the cholera.

Hays.—Our farm animals are in remarkably good health and condition. We have been free from all contagious diseases for three years past.

Hill.—A disease heretofore unknown has been quite troublesome to horses in this neighborhood. Our stockmen generally designate it as "loin distemper." Cholera among hogs and fowls is frequently quite prevalent and fatal.

Hopkins.—Horses in this locality are affected with glanders, and cattle with bloody murrain. Hogs are affected with cholera, and a disease which causes wheezing and choking, as of a hard lump in the throat. These diseases generally follow an acorn crop. Sheep die with scab, and a great many fowls are lost by cholera.

Jasper.—Farm animals are in much better condition than for several years past. No contagious disease prevails except among hogs, and the losses are quite small, as we raise but few hogs in this county.

Kerr.—I have never known an infectious or contagious disease to prevail among horses and mules in this county. Fifty-four cattle have died during the present year of dry murrain. A large number of goats and sheep have died of foot-rot and scab. A great many hogs have died of a disease termed sore eyes, and many fowls have died of cholera. So destructive has been the latter disease that many farmers are entirely without chickens. The condition of all farm animals, however, is a little better than the average.

Lavaca.—Ticks kill a good many colts in this county every spring. We have some distemper among horses, but it has rarely been fatal. Until this year hogs have always been healthy, but for several months past cholera has prevailed among them, and in some neighborhoods all have died. The disease seems to be contagious, and I think was introduced by the importation of fine breeds.

Llano.—Owing to depredations by Indians, but few horses are raised in this county.

Cattle are moderately healthy, and hogs entirely so. Sheep have scab occasionally, but the disease is cured by dipping. Fowls are subject to cholera, and I never knew one to recover from an attack of this disease.

Marion.—We have had, and still have, hog and chicken cholera in several localities in this county. It is very destructive during some seasons.

Matagorda.—Cattle in this locality have been healthy this year with the exception of an epidemic of ophthalmia, which seemed to be atmospheric in its origin; or, in other words, it was caused by excessive heat and moisture. A good many horses have died from the effects of bites and stings of insects, which were never so bad before. Ticks, screw-worm, and the large horse or cow fly have destroyed many animals. Measles prevail among young pigs and shoats, and a good many of those attacked die. This disease is both contagious and infectious.

Maverick.—There are no hogs raised in this county. Horses and cattle are healthy. There is some scab among sheep, but much less than in former years.

Menard.—The disease called scab prevails among sheep, yet I believe a greater number die from careless management than from this or any other disease. Other classes of stock are healthy and in good condition.

Montague.—Cholera among hogs prevails to some extent this season, but the disease is not so general as in former years. The general condition of farm stock is good.

Navarro.—The losses among hogs in this county from cholera and other diseases will aggregate for the past year not less than \$15,000 in value. Chickens also die of cholera, and sheep from liver-rot and scab. Horses and cattle are healthy.

Rusk.—Hogs and chickens are suffering with a disease called cholera, which seems to visit some portions of the county annually. Various preventives are used, but no specific has as yet been found for it.

San Patricio.—There are no diseases affecting any class of farm animals in this county. I have resided here twenty-seven years, and this is the first year within that time that any important disease has prevailed among fowls. About nine-tenths of them have died in this town and surrounding localities of cholera, at least the disease was so pronounced by those who know the symptoms.

Somerville.—Stock of all kinds in this county have been unusually healthy this year.

Titus.—Infectious and contagious diseases affecting horses are not so fatal as heretofore, though glanders and distemper kill a great many. A large number, however, are lost by staggers and bots. Cattle are affected with murrain and black tongue, and nearly all die that are attacked by these diseases. Many also die from feeding on acorns. A great many hogs are annually lost by cholera and red mange or measles, thumps, and staggers. Scab, rot, glanders, and black tongue produce fearful ravages among sheep. We have no remedy for these diseases.

Upshur.—A good many cattle and hogs have died in this county during the past year of diseases peculiar to these classes of farm animals.

Uvalde.—Horses die of blind staggers and a kind of lung fever, and cattle of lung fever and spinal diseases. The principal disease among hogs is cholera. Sheep die of scab and lung fever, and chickens of cholera. We have no successful remedies for any of these maladies.

Victoria.—This has been a very disastrous year for sheep, owing to the great amount of wet weather. There is no disease among native cattle, but about one-third of those imported die of Spanish fever. Horses, and especially colts, die of distemper.

Williamson.—The principal disease among horses is distemper. The disease prevails to a greater or less extent every fall, and principally among colts. The losses among cattle are generally occasioned by the same disease. We occasionally have hog and chicken cholera, but the losses are not very heavy from this disease. A few sheep are annually lost by scab, but not so many as in former years.

Young.—All kinds of stock and poultry have been unexceptionably free from disease during the past year.

UTAH TERRITORY.

San Pele County.—Contagious diseases have prevailed among cattle in this county during the present year. A few cases of bloody murrain have also occurred.

Wasatch.—There is no malignant disease prevailing among farm animals in this county. Fowls are subject to croup, of which a good many die.

VERMONT.

Addison County.—Horses are afflicted with a distemper which is regarded as contagious. Cattle have what is called murrain or black-leg, a disease which seems to be epidemic and contagious, but is confined mostly to calves. Murrain never attacks lean cattle. Many deaths occur among cows in early summer from milk fever. Cattle generally are in fine condition.

Caledonia.—No infectious or contagious diseases of a serious nature have prevailed among farm animals in this county during the past year. The season has been favorable, and stock generally is in good condition.

Chittenden.—The number of cows have increased in this county since the last census, nearly one-sixth. Horses and swine remain about the same. Sheep have fallen off materially, say three-fourths. At present there is a lively interest in fowls, especially of pure bloods. The number has increased at least one-third. Our animals are all in a healthy condition.

Grand Isle.—Since the prevalence of the epizootic some years since, there has been no infectious or contagious diseases among horses in this county. Cattle, sheep, and hogs are almost entirely free from disease. I ascribe such exemptions to the better care they receive in good feed, protection from storms and cold weather, and better care generally.

Rutland.—Foot-rot has prevailed extensively and fatally among sheep in this county during the year, but the disease is now diminishing.

VIRGINIA.

Accomac County.—The annual losses from disease among all classes of farm animals in this county will amount to from \$12,000 to \$15,000.

Alexandria.—Upwards of 100 head of cattle have died in this county during the past year, principally of pleuro-pneumonia. The origin of the disease has been traced to Georgetown. It occurred first among cattle there about two years ago, and has since gradually traveled down the river to a distance of about 25 miles. It has not, as yet, extended over 2 miles from the river toward the interior.

Botetourt.—There has been no infectious disease among horses in this county for several years past. The disease affecting cattle seems to be confined to those under one year old, and is known as bloody murrain. Those that are best kept are more liable to the disease than those poorly cared for. Flour of sulphur given with salt once a day for three days is the best remedy known here. Hog-cholera, the only disease affecting swine, is less malignant than in former years. Cholera in fowls has been successfully treated by placing iron in the water which is given them to drink.

Brunswick.—Cattle sometimes die in large numbers from a disease called murrain. A good many hogs are also annually lost by cholera, a disease which appears under many different forms or symptoms.

Campbell.—We have had no infectious or contagious diseases either among our horses, cattle, hogs, or sheep, with the exception of an unknown disease that has prevailed among cattle in the vicinity of Lynchburg. Cholera among fowls sometimes depopulates an entire henery in a few days.

Dinwiddie.—A good many horses, cattle, hogs, and fowls have died this season from the various diseases incident to them. Cholera prevails more or less every year among hogs in this county.

Essex.—I have heard of no infectious or contagious diseases prevailing among any class of farm animals, except swine.

Floyd.—The only contagious disease among horses here is a distemper which affects very seriously the head and throat of the animals. The most fatal disease among cattle is black-leg. Its attacks are more frequent among young animals of from one to two years of age. The only disease affecting swine is known as hog-cholera. All other animals are healthy.

Gloucester.—A large number of horses, hogs, and sheep have been lost by disease in this locality during the past season. The disease affecting hogs is the so-called cholera.

Greene.—The infectious and contagious diseases prevailing here are distemper among horses, and cholera among hogs and chickens.

Halifax.—An infectious distemper is prevailing among horses in this county, and murrain and distemper among cattle. The latter seems to be a contagious fever, and kills nearly all attacked. The prevailing diseases among hogs are measles and quinsy. There are no diseases among sheep. The condition of all farm-stock is good, better than last year, as pastures have been abundant. The cattle distemper, which is a high grade of fever, and generally considered contagious, is the worst disease farmers have to contend with. No effectual remedy has been found, but the following has proved generally quite a successful preventive: 1 gallon common salt; $\frac{1}{4}$ pound flour of sulphur; 2 ounces saltpeter and 2 ounces copperas. Dissolve these ingredients in three gallons of water and mix with red clay to the consistency of plastering mortar, and put in troughs for the cattle to lick. The troughs should be kept supplied from the first of July to the first of November. It rarely fails as a preventive.

Henrico.—Hog-cholera has been very severe here during the past season. About all the hogs affected have died.

Highland.—The prevailing diseases among horses are lung fever, distemper, diarrhea and mad stagger or fits. Cattle have horn-ail and hogs are afflicted with cholera. Domestic fowls also have cholera.

James City.—Horses are frequently affected with a distemper, the results, no doubt of former attacks of epizootic. Hogs are afflicted with cholera and mange. In cases of

cholera a change of both pasture and food is recommended. Raw turnips fed on alternate days are thought to be a preventive.

Page.—Perhaps \$5,000 or \$6,000 will cover the loss among all classes of domestic animals by disease in this county during the past year. Farm stock is in much better condition than usual.

Patrick.—There have been some losses of horses in this country by distemper and cattle by murrain. Hogs, as usual, have been seriously afflicted with cholera.

Pittsylvania.—The principal disease among horses in this county, during the past year, has been pneumonia or lung-fever, which is not considered contagious. Cattle are afflicted with murrain, and hogs with various diseases.

Rappahannock.—The number of horses and cattle affected with contagious diseases in this locality is small. Some few hogs die of cholera. Sheep are healthy.

Roanoke.—No diseases have prevailed among farm animals in this county during the past year. There has been some cholera among chickens, but the disease has not prevailed as an epidemic.

Rockbridge.—Black-leg is the only disease that affects cattle fatally in this county. I do not think it contagious, though all the animals attacked by it die. Hogs and fowls are sometimes fatally affected by cholera.

Smyth.—Distemper has prevailed to some extent among the horses in this county, but it has proved fatal in but few instances.

Spottsylvania.—No diseases of a malignant character have prevailed among farm stock in this county during the past year.

Sussex.—Cholera has, and still is prevailing to a considerable extent among hogs and fowls in this locality. The losses have been quite heavy.

Washington.—Distemper and murrain prevail among horses and cattle, and cholera among hogs. A disease similar to murrain also prevails among sheep. Fowls are annually lost in great numbers by a disease called cholera.

Winc.—Diseases have prevailed to a considerable extent among hogs in this county during the past season. All other classes of farm animals are healthy.

WASHINGTON TERRITORY.

King County.—There are no infectious or contagious diseases among horses, cattle, or hogs. Sheep, however, are afflicted with scab, and fowls more or less troubled with vermin.

San Juan.—No infectious or contagious diseases exist among either horses, cattle, hogs, or sheep in this locality. There are frequently losses among all classes of farm stock from accident or lack of proper attention.

WEST VIRGINIA.

Boone County.—Epizootic distemper prevails among horses, murrain among cattle, and cholera among hogs. Fowls are subject to both cholera and gapes.

Doddridge.—Distemper is the only contagious disease prevalent among horses and that of foot-rot among sheep. Murrain also exists among cattle. All of these diseases are destructive, but none of them so much so as cholera among hogs. Many persons regard this disease as contagious.

Gilmer.—No diseases of any consequence are prevailing among farm stock in this county. Occasionally a horse is affected with distemper, but I have never heard of a case of lung-fever. Cattle are sometimes affected with foot-evil, which is the only disease I ever hear of as affecting this class of animals. I have heard of a few cases of cholera among hogs.

Grant.—I have made diligent inquiry, but can hear of no infectious or contagious diseases existing among the farm stock in this county.

Greenbrier.—There are no infectious or contagious diseases prevailing among farm animals in this county. About 13,000 chickens and other domestic fowls are annually lost by the people of this county from disease.

Harrison.—The only disease we have among horses is an infectious disease, which, for the want of a better name, we call "distemper." Horses that have it, generally recover. Among young cattle we have a disease called "black leg," which annually kills a number of cattle, and generally those in high condition. Our losses are sometimes very heavy from this cause. We also have a disease among cattle which affects their feet, and which we call "foot-evil." This disease does not kill cattle, but hinders them in their growth and deteriorates them in value. If a simple and sure remedy could be found for this disease it would save our people a considerable annual loss. We occasionally have a case of hog-cholera, and those attacked usually die, but, as a general thing, hogs are very healthy in this county. Chickens, in some localities, have suffered with cholera, and the flocks attacked generally all die.

Levia.—No diseases of any consequence have affected the farm animals of this county during the past year. Pasturage is very abundant, and cattle are generally in good

condition. Hogs are in good health, which we attribute to their consumption of bituminous coal.

Logan.—Horses here are much given to distemper. Sometimes the disease proves fatal; but the greatest loss occurs from colic and bots. Cattle sometimes have a distemper much like that of horses, but this seldom occurs. Diseases are prevalent among hogs, and they often die quite suddenly. Sheep and fowls are in pretty good condition. Sometimes the former are afflicted with rot.

Morgan.—The number of hogs and chickens that have died in this county during the past year of cholera has been very large. Other classes of farm stock have been healthy.

WISCONSIN.

Door County.—No infectious or contagious diseases prevail among any class of farm animals in this county.

Dunn.—Last winter horses in this county were seriously affected with distemper; but it disappeared in April and has not since made its appearance. Several animals were lost. Cattle and hogs are healthy, and are in very good condition.

Green.—The so-called cholera has prevailed among the hogs in this county for the first time during the present year. A great many have died. Cholera prevails extensively among fowls also, and many thousands have died.

Iowa.—Diseases among swine have been very prevalent during the past year, and the losses to the farmers of this county have, consequently, been very heavy, as the maladies have been of a fatal character. Other classes of stock have been healthy.

Jackson.—There are no diseases whatever of a destructive nature prevalent among farm animals in this county.

Juneau.—Distemper and inflammation of the lungs, or lung fever, are the only diseases of a serious character prevailing among horses. Other classes of stock are healthy.

Keokauce.—Aside from a few horses afflicted with glanders, all classes of farm animals are in good health.

Monroe.—All classes of farm animals are in good condition and measurably healthy.

Ozaukee.—With the exception of a few cases of hog-cholera, I have heard of no other disease among farm animals in this county.

Portage.—Domestic animals in this county are exempt from contagious diseases to a remarkable degree. Indeed, I hear of but few farm animals dying of any disease, except sheep and hogs—sheep from grub, and hogs from black vomit, or something like it.

WYOMING TERRITORY.

Laramie County.—There are no diseases whatever among farm animals in this county. The losses among cattle, caused by eating the poisonous loco weed, will perhaps not exceed 1 per cent. About 300,000 head of cattle come into the Territory annually from Texas, Oregon, Montana, Idaho, and Nevada.

CORRESPONDENCE RELATING TO THE MORE COMMON DISEASES OF DOMESTICATED ANIMALS.

ALABAMA.

Mr. Robert Wardland, Tuscumbia, Colbert county, Alabama, says:

Not having had much experience with farm animals, I will confine my remarks to fowls and the ailments to which they are subject. I grow them for my own table, and not for market or fancy purposes. Long years ago I devoted considerable attention to fowls, and soon became satisfied that the majority of the diseases incident to them were induced by carelessness and inattention to their sanitary condition. I have found that prevention is much better than cure, and now, if I desire a sick chicken to experiment, I am compelled to go to some of my neighbors for the subject. In cases of what is known as cholera, the liver of the chicken is found very pale, much enlarged, and literally rotten. The whole internal viscera is more or less deranged. With such cases it is the veriest quackery to attempt a cure. A careful examination of the disease known as gapes has convinced me that it has its origin in parasites. These, and that other great pest, lice, produce many of the diseases which result so fatally to fowls.

My treatment of fowls, which has proved very successful, is very simple. I give them a well ventilated yet cheap house, provided with plenty of roosts, nests, &c.

Next, I have none but healthy birds to breed from, and am very particular to keep their quarters perfectly clean. I have my hen-house cleaned once a week during summer, and once in every ten days during the winter season. I remove the contents and have them stored under cover for use as a fertilizer for my crops. I use quick-lime and wood-ashes as disinfectants, and charcoal as an absorbent. The result is clean houses and healthy fowls.

I pay close attention to their food. Too much corn makes them fat and indolent. Once or twice a day is as often as they should have grain. They should be provided with grass lots for grazing, as the amount of this kind of food they will consume would astonish any one who has not given the subject attention. Pure water and plenty of it is indispensable. Sick birds should at once be separated from the well ones, but the best plan is to cut off their heads and bury them.

I am partial to dark-colored fowls, as I am of the opinion that they are more hardy than the light-colored ones. I am careful not to overstock my flock, and breed only from those that are peaceable, and as a result have no games or ill-natured fowls.

Mr. V. C. Lavmore, Valley Head, De Kalb county, says:

My observations and experience with farm stock extends to a period of near forty years. In the care of horses I am particular to give them good grazing and sound feed. In winter I give them good shelter and feed both hay and grain. I also give them salt and ashes, slaked lime, and copperas or saltpeter. During the summer months I keep the nits cleanly scraped off from their limbs and bodies. I practice about the same treatment with cattle, and in addition use sulphur, rosin, and turpentine in the summer and fall to keep off the ticks. I use the same preparation to remove lice from my hogs. When disease is in the neighborhood I give them salt and ashes, and sometimes turpentine. My hogs have been visited but once with cholera, and then they had it very bad. I tried everything I could hear of, but to no purpose until I separated them into three different lots. I put the well ones into a field by themselves, those that looked feeble into another, and the sick ones I turned into a meadow through which a stream passed. I drove them through this creek once or twice a day. I burned all the dead carcasses, old beds, and even the woods where they had been running in the mast. I had about two hundred head, and many of them died, but they commenced to improve soon after I commenced this treatment, and soon the disease disappeared.

Mr. R. Tucker, Marion, Perry county, says:

Hog-cholera seems to prevail throughout the United States, and perhaps more hogs die from the effects of this disease than from all other causes combined. I have been using preventives for years, and when I attend strictly to this duty I hardly ever lose a hog by cholera or any other disease. I use copperas, lime, ashes, charcoal, sulphur, and tar. The most of these articles are good for worms and keep the hog in a healthy condition. Cholera makes its appearance in various forms, and in many cases, I think, what we call cholera is caused principally by worms.

In this latitude we have a disease called murrain among cattle, which, perhaps, is more destructive than any other to this class of domestic animals. It usually makes its appearance in the spring of the year. We have what is known as both the dry and bloody murrain. As preventives we use salt and sulphur freely, and keep tar in the feeding-troughs. When a severe case makes its appearance it is hard to cure, though soap and oil have been used in cases of dry murrain with some success.

Blind staggers seem to be the prevailing disease among horses and mules. A horse properly fed on sound corn and hay, with lime, wood-ashes, tar, and sulphur constantly in their troughs, will never have the blind staggers. Bots and colic also kill a good many horses. Oil and chloroform will generally effect a speedy cure in such cases.

Dr. George T. McWhorter, Chickasaw, Colbert county, says:

In connection with my report of the hog-disease, which prevailed so fatally here during the past season, I desire to call your attention to reports from Van Wert and Preble counties, Ohio, Iroquois county, Ohio, and Lauderdale county, Alabama, found in the Report of the Commissioner of Agriculture for 1876, page 108. I am convinced that the "new disease" mentioned by correspondents from these counties is the same that prevailed here, and that it is caused by the worm, specimens of which I sent you. You will observe that all call attention to the lung trouble, some stating that the lungs were the only parts affected. By careful examination I found, as stated in my report, the lungs, liver, stomach, and bowels infested by these worms, but in every case the lung tissue had suffered most, in some cases being entirely broken down.

I suspect also that much of the pneumonia (page 109, same report) reported from Kentucky, Illinois, Ohio, Indiana, and Kansas is due to the same cause. The trouble is so much more patent in the lungs than elsewhere that it might reasonably be overlooked in other situations. You will remember that the worms taken from the lungs were much larger than those from the bowels. I attribute this to the inferred fact

that the lungs afford better conditions for their development than the other organs. The fact that their presence in the lungs is so much more deleterious to the health of the animal, and manifests itself by such decided symptoms, is perhaps the reason that some have supposed that they alone were affected. I am still of the opinion that the alimentary canal is the *nidus* in which the egg is hatched, and from which the young worm starts, producing violent and noticeable symptoms when the lungs are reached and perforated.

ARKANSAS.

Mr. William B. Turman, Waldron, Scott county, says:

As hogs are the only class of farm animals affected by disease in this locality, I will confine my remarks to the malady generally known as hog-cholera. The symptoms are a cough, followed by constrained breathing, producing, in many cases, a movement similar to thumps in horses. The animal refuses food. After a while great thirst prevails, and scarlet red spots, from the size of a pin's head to that of a man's hand, appear on the surface of the body. At this stage of the disease they refuse to leave their beds. In some cases death ensues within a few hours, while in others the animal may linger for several days. Perhaps one hog in ten survives a mild attack. An examination after death reveals the lungs, to all appearances, greatly affected, and in many cases much decomposed. In some cases the blood is also found coagulated in and around the kidneys, and the entire flesh in a more or less putrid condition.

I am informed by Mr. W. M. Johnson that for the last twenty years he has kept his hogs healthy by giving them, with their food, common pine tar, occasionally smearing some on the hair of his hogs. He has not lost a single hog by this very common disease.

Mr. Dearman keeps his hogs healthy by giving them soap, pine tar, and sulphur. Mr. A. J. Gentz keeps his in good condition by mixing boiled garget or poke root with their feed. Mr. A. H. Hooper gives sulphate of iron and salt, which has proven an excellent preventive with him.

Mr. W. W. Hughey, Warren, Bradley county, says:

There has been no disease in this immediate vicinity that has seriously affected swine since 1873. During that year fully three-fourths of the hogs in the county died of what is commonly known as hog-cholera. The first symptom of the disease was a refusal to eat, followed by a dull, stupid appearance. Frequently eruptions about the size of a pea would appear on the body, and death would then ensue in from five to twelve hours. In a few hours after death the carcass would swell to such an extent as to break the skin in many places, from which a yellowish water would run.

About the 20th of December last, a similar disease made its appearance in the western part of the county, which is proving quite fatal to grown and fattened hogs. Not more than one in five of those attacked recover. We expect it to spread throughout the county by the first of May, as it did on its former visit. Hogs are not raised here for market, yet most farmers endeavor to raise a sufficient number to provide themselves with their own meat.

Mr. J. N. Deaderick, Wittsburg, Cross county, says:

The most fatal diseases we have among horses here are staggers, Spanish fever, and charbon. In sleepy staggers a disposition is shown to move around in a circle. The general treatment is blistering over the brain and profuse bleeding from the nose. The disease lasts from one to two days, and the fatality among those attacked is about 90 per cent.

In Spanish fever the symptoms are extreme languor, stupor, and high fever. The duration of this disease is from five to fifteen days, and the per cent. of deaths about the same as in staggers.

Charbon first makes its appearance by a small hard lump, somewhat resembling that caused by the sting of a wasp. This lump grows and spreads very rapidly, and frequently chokes the animal to death in a few hours. The remedy generally used is to paint with iodine.

Cattle are affected with murrain, Spanish fever, and charbon, and occasionally a disease resembling dropsy in the human system. When attacked with the latter disease they generally drop dead without a struggle, and on tapping them, very often as much as a barrel of water will exude from the incision. The fatality in murrain is about 95 per cent., and in dropsy all die.

Hogs are affected with cholera, quinsy, and mange. The symptoms of cholera are varied. In the most violent cases there are discharges from the bowels, bladder, and lungs. In other cases a loss of appetite is occasioned, and there is a disposition to bed up during the night; and during the hottest weather, if driven from their beds, they will shiver as though suffering with a hard chill. The loss is about 75 per cent. of all attacked. A great many remedies are used, but with little success. I value soft soap

more than anything else. Pine tar is a good remedy for quinsy. Mange or scab is very fatal to young pigs. It appears as ulcers in the mouth, throat, and in the body. Carbolic acid, sulphur, and turpentine are used with considerable success. The fatality in this disease is about 50 per cent. of those attacked.

Sheep are sometimes affected with rot, a disease somewhat resembling Spanish fever or dry murrain in cattle. The fatality is about 50 per cent.

Chickens are liable to cholera, and often drop dead from their roosts without warning. Others have copious discharges of filthy, green matter, their combs and gills become very pale, and after lingering a week or two die in a very emaciated condition. It frequently happens that some farmers will lose their entire flocks by this disease, while others living near by will not lose any. There seems to be no remedy, and about all die that are attacked by the disease.

FLORIDA.

Mr. T. K. Collins, Mikesville, Columbia county, says:

A disease commonly called "thumps" is perhaps the most fatal disease that affects hogs in this part of Florida—more fatal from the fact that no remedy has ever been found for it, at least to my knowledge. I have resided here seventeen years, and during that time have not known a single case cured, notwithstanding 8 per cent. of our hogs die of it annually. The first symptoms of the disease are a cough, shortness of breath, thumping or bellows-like motion of the sides, with loss of appetite, and ultimately, like in cases of consumption in man, waste away and die a mere skeleton. The duration of the disease is from one to three months. I can offer no remedy for this disease, or even suggest its cause. Some old stock-raisers say that this disease is always worse after a heavy pine mast, which my own experience confirms.

Staggers is also a common disease among hogs here, but it is seldom fatal. Cutting the ears or scarifying the head generally gives relief, but cold applications or sun-stroke treatment, when applicable, is considered better.

Cholera made its appearance among swine here this season, and cut our meat crop short. Most of those attacked died suddenly, many of them even before they were known to be sick. This disease is new to us, and as yet we have found no remedy for it. These are about the only diseases that attack swine in this locality.

Mr. Chester S. Coe, Coe's Mills, Liberty county, says:

With the exception of cholera among hogs we have but few other diseases among any class of farm stock. As regards this disease we have never been satisfied as to its origin, as hogs take it at any time and under all circumstances, those running at large in the range as well as those kept in inclosed pastures. During many years' experience I have noticed that those which we term yard hogs—i. e., that are fed on dish-water and kitchen slops—seldom or never take the cholera, and that if those that take it in the range are confined in pens and fed on kitchen slops, with the addition of a little copperas and sulphur, they generally get well. As for a preventive, we have never found a positive one, though I am of the opinion that if hogs are frequently fed on slops seasoned as above stated they will seldom take the cholera.

In an every-day experience of over sixty years in the use of horses and mules I have never lost but one, and that one I lost by blind staggers. Good care in feeding, watering, and driving, with an occasional handful of salt mixed with a little lime or strong ashes, has always kept my stock in health and good order.

I have had no disease among my fowls for thirty years. We keep a supply of nuxvomica on hand, and twice or thrice a week mix it with their feed, giving from a fourth to a teaspoon level full, according to the number to be fed. This has kept them free from all disease; and more than that, if a hawk ever takes one he will never come back for another. There is no perceptible difference caused in the taste of the meat. The drug may be used by bruising two or three buttons and steeping them in hot water. Then add a few spoonfuls in mixing up their feed.

INDIANA.

Mr. D. C. Smith, Vincennes, Knox county, says:

The disease known as hog-cholera is caused by worms. There are two kinds of worms. One works upon the kidneys, liver, heart, and lungs, and is more dangerous when it is in the region of the heart. It looks like a kidney-worm, but is somewhat smaller. It penetrates to all parts of the body. I have found it between the leaf-lard and the intestines, and between the shoulder and the ribs. The other worm works upon the stomach and small intestines, and causes the diarrhea. When they are in the liver they cause a dry, hacking cough; when in the lungs the cough is more severe, and

the hog will bleed at the nose, and a bloody foam will run from its mouth. The symptoms of the disease may be seen in the hair of the hog standing up straight, and the discoloration of the skin behind the ears, which sometimes turns yellow and at others assumes a bluish cast. The hog will walk very slowly, and when it stops will drop its head and look as though it were standing on its nose. Some will become lame in their fore legs. When the worm is in the stomach the hog will purge and vomit.

I have taken as high as ten worms out of the liver of one hog.

I have a remedy for these diseases, which I have used with great success for ten years. Since using it I have never lost any hogs by cholera. The remedy is as follows: Mix two tablespoonfuls of spirits of turpentine in a half-barrel of slop, stir well, and feed three times a week every other week. Give this amount to fifteen or twenty head. While they are eating pour a tablespoonful of coal-oil across the back and shoulders of each hog. This will penetrate the skin and drive the worms inwardly, when the turpentine will kill and expel them.

The following are extracts from a letter from Mr. Lewis Bollman, of Bloomington, dated August 26, 1878:

I see that you have appointed a commission to investigate the hog-cholera. I hope that it may result in some greater practical utility than prior commissions have effected. Allow me to add to this communication the little I know about it.

I have always understood that the disease originated at Aurora, in this State, a town on the Ohio River, in Dearborn county. A large distillery is there, and years ago it fed about 4,000 hogs on the distillery slops. This excessive crowding and unnatural feeding generated the disease, and from there it slowly but steadily spread over the West.

While a farmer here years ago, I raised from 50 to 75 hogs annually, and for three years my neighbors lost many hogs with this disease. One year my adjoining neighbor lost about 70 head; there being between our hogs the common rail-fence only. I never had a hog sick from the cholera, and I attribute this exemption to my practice of salting my hogs with a mixture of salt and pulverized brimstone and copperas. Of three parts, two salt; of the remaining part, two parts brimstone and one part copperas. I adopted this salting to destroy intestinal worms and lice. I strictly adhered to this practice twice a week in summer and about every ten days in winter.

A farmer here told me the other day that he lost hogs one year only from the disease, but having adopted this feeding with sulphur and copperas he never since had any of his hogs sick with it.

Whether this salting is really a preventive I cannot certainly say. I but state my experience. In its modes of infection the hog-cholera is much like the rinderpest when in Great Britain. If well animals crossed the track of diseased ones they caught the disease, as with cholera. If I remember rightly British authorities were forced to confine their cattle to the farms of their owners and to prohibit the sales of unfattened cattle at fairs where such are generally purchased by those purposing to fatten.

So far as my observation extends I believe this moving of our hogs, and allowing them to run outside of their owner's inclosure, is the cause of the continued existence of the disease.

A farmer here recently rented an out-field to hog down, located about a mile from his home. The first thing he knew was that that field emitted a stench from his dead hogs. About \$300 worth died in a few days, nearly all that he had. So I learn that many have died around this place in consequence of their running at large. The greatest fatality exists on our river bottoms where the hogs are collected by purchase and driven on the extensive corn-field to hog down the corn.

I suggest to your consideration a careful examination into the consequences of this mode of moving stock hogs in order to fatten them, and if found to be a common and fruitful source of the spread and continuation of the disease that the exclusion resorted to in Great Britain be enforced here. It is a quarantine regulation such as is now sought to be enforced in our Western cities to stay the spread of the yellow fever.

Believing that he had made an error in attributing the cause of the disease in this herd to the fact of its removal to another farm, Mr. Bollman writes as follows under date of September 2, 1878:

A few days ago I wrote you a letter, chiefly on the topic of hog-cholera, mentioning a recent case of a farmer here who had lost about \$300 worth of hogs by that disease. I attributed the loss to moving the hogs to another farm. I saw him since writing, and learn that it is probable the hogs were liable to the disease before their removal. He has raised hogs very extensively, and heretofore has lost heavily from the cholera. His recent loss, I am now satisfied, was the result of overcrowding his farm with hogs—an error so certain to this result that I now again write that the attention of your commission may be directed to it.

One of the greatest difficulties a farmer has to encounter arises from having a large number of certain kinds of stock, which cannot safely be crowded, no matter how complete may be his arrangements to grow them, or any one of them.

Hogs, sheep, fowls, the silk-worm, &c., cannot be raised in large numbers together without soon exhibiting a liability to epidemical and other diseases. The diseased condition of the sheep at the close of the war obliged farmers to sell their flocks at the lowest prices. All attempts to raise chickens in large numbers, or the silk-worm, have failed from large losses by epidemical diseases. And so with the human race. An army generates camp-fever, measles, and other diseases, no matter how strictly every sanitary regulation may be enforced.

As a farmer, I found it was easy to raise twelve or fifteen hogs, but difficult when the number was increased to fifty or eighty. I mentioned my exemption from hog-cholera, as I suppose from the regular salting with copperas, but I am satisfied that as long as any farmer, from year to year, grows many hogs together, the hog-cholera cannot be eradicated. Few farmers understand this tendency to fatal diseases from too great numbers, and I hope the commission may give it a thorough examination.

ILLINOIS.

Dr. Joseph Sybertz, V. S., Bellville, Saint Clair county, Ill., contributes the following paper on the disease commonly known as "hog-cholera":

We must regard this affection of pigs as a disease peculiar to this species of the family *suida*, having close affinities with the scarlet fever of man, yet essentially distinct. Few diseases are designated with a greater number of names than this one. For instance, it is called enteric fever, typhus, pig distemper, epizootic influenza of swine, measles, scarlatina, gastro-enteritis, anthrax, &c. Some authorities advocate the theory that the affection known as hog-cholera is in reality typhoid fever (abdominal typhus). Veterinary authorities agree that it is a form of anthrax or carbuncular fever. But there is an essential difference between anthrax and typhoid fever.

In the first-mentioned disease, the presence of bacteria in the blood is invariable, these parasites, indeed, being considered the cause of the affection. In typhoid fever, bacteria have never been discovered, either in the blood of the patient or in the characteristic lesions of the disease, the determining symptoms in this affection being ulceration of the glands of Peyer, as shown in *post-mortem* examinations. Now, in all forms of anthrax this ulceration is never seen, although mycosis (fungus) of the intestines is frequently noticed.

The line of demarcation between these affections is, then, sufficiently broad; but to which of them does hog-cholera belong?

Hog-cholera is a disease peculiar to pigs of this part of the country; the virus is not communicable to other domestic animals, so far as is ascertained up to this time by the veterinary surgeons of this country.

For the sake of brevity, I will, in dealing with the disease, call it by the conventional or rather common name of hog-cholera.

Hog-cholera is a contagious, febrile, and exanthematous disease, and embraces scarlatina in degrees of virulence in all stages.

Course of the disease.—*a*, stage of incubation; *b*, stage of florescence; *c*, stage of desquamation (scaling off).

The contagion poisons the blood, and produces local inflammation and ulceration in various parts of the system, though more frequently in some portions than in others. The action of this contagion possesses the peculiarity that it affects chiefly the skin and the throat, and originates in both a diffuse inflammation.

Symptoms in general.—*First stage:* Fever with a full and frequent pulse; the pharynx presents an exanthematous flush, but there is no effusion; general debility; appetite smaller than in health; thirst increased; skin hot and dry; sometimes a profuse diarrhea, and in single subjects delirium or spasm. The urine remains of its natural color.

Second stage: More intense fever; elevation of the temperature of the rectum to 35° 40° Celsius; tremulous motions of the cervical muscles; pharynx inflamed; deglutition difficult; the amygdalæ swollen; the mucous membrane presents a vivid red appearance. There is occasionally vomiting or diarrhea, usually constipation. A dry, hard cough is one of the symptoms in early stages, and continues to the last; quick and vibrating pulse, and occasionally epistaxis (the state of bleeding from the nose). Increased heat and redness of the skin; the eruption is not so generally distributed as in the former affection; it disappears often suddenly, and returns after an uncertain period of time. By the effusion of the red points, the disease passes on to the—

Third stage: The symptoms are of a graver type, even in the first accession. In fatal cases the patient is, in fact, by an elevation of the temperature to 43° Celsius, stricken dead by the poison in a few hours, before any eruption or local symptoms come on. The eruption does not present scarlet appearance, but is more of a livid

hue, and frequently interspersed with petechiæ. In young animals convulsions and coma are frequent concomitants; in grown, delirium and deafness, sometimes great restlessness, running round towards one side, until at length the patient breaks down and lies helpless and insensible, or in a muttering delirium, till at length death approaches silently, and life ends without a struggle. The temperature is high until death approaches and bloody urine flows, when it very perceptibly diminishes.

The sequelæ of the disease are: Anasarca (effusion of serum in the cellular substance); ophthalmia (inflammation of the membranes or coats of the eye or eyeball); otitis (inflammation of the ear); enteritis (inflammation of the intestines); and cynanche parotidia (inflammation of the salivary glands), causing difficulty of breathing and swallowing; in grown hogs, affection of the sub-maxillary (mandibular) and inguinal gland, the last mentioned causing the staggering gait in young animals.

A secondary stage frequently follows, mostly caused by catching cold or by a disturbed crisis; then metastasis (a sudden and complete removal of the disease from one part to another) often occurs. This would seem to account for the fact that medical experts found so many different lesions by *post-mortem* examinations.

The next cause of the disease is an atmospherical contagion, which is always transferable. The infection is therefore double, atmospherical and individual.

Only constant lesion (and it is questionable whether it can be considered entirely characteristic) is the want of coagulability of the blood and the petechial eruption; all other lesions may be considered incidental; sometimes scarcely one organ of the body is found that is not the seat of some anatomical lesion.

If we consider the hog-cholera as an independent disease, and the malignant throat disease as a partial symptom of it, or the latter disease as an independent typhus disease, an infection of the blood, and the first as a partial symptom of it, has been up to this time, so far as I know, not ascertained, and the process of this epidemic is still a mystery, as in other epidemics.

In single cases and in epidemics it has sometimes the character of a local affection (malignant throat disease); in others, more the character of a general illness (infection); or it may be distinguished by this, that it occurs in all forms intermixed.

I have seen in different hygienic conditions swine affected with the disease, but, by perfect cleanliness, which necessitates the separation of the sound from diseased, and the free use of disinfectants, the poison, even generated or introduced, will be virtually starved out. In neglected hygienic conditions, I saw patients without care and treatment recovering, and on the contrary, the best rules and remedies designated for the prevention and most careful treatment could not prevent them from dying. These are sporadic cases. If the epidemic has existed for a length of time, the disease will seem to become more mild, and a much larger proportion will recover, while the first cases that occur will be very severe and will nearly all prove fatal.

In my practice as a veterinary surgeon I have tried many recommended remedies, but without much success.

I have adopted the following rules: As a preventive, disinfection of the atmosphere and the surrounding objects, and disinfectants for the free use of the animal. Protect them from the hot-bed of manure and close sleeping-places, where they are huddled together in great numbers; supply them with sufficient fresh straw for bedding in different places, as far as possible from each other. Supply them with fresh water and a succulent diet.

When the disease exists the sick should be placed by themselves, and the healthy ones taken to a fresh and disinfected place. Very sick hogs, without any hope of recovering, should be instantaneously taken from the herd, killed, the carcasses interred very deep, and with quick-lime and sulphate of iron overstrewn, so that no noxious emanation takes place.

For disinfection of fecal matters of stables, pens, or other places giving rise to noxious emanations, fill up a bucket with a strong milk of lime, add about one-half pound of sulphate of iron before separately dissolved in water, and sprinkle it upon the places which you intend to disinfect.

For disinfection of surrounding objects, as stable-walls, troughs, pen-rails, &c., take a strong solution of chloride of lime (1 pound to 12 pounds water), and whitewash the objects. This operation develops much chlorine, which destroys the contagion and purifies the surrounding air.

A specific remedy in general never will be found; disinfectant, diaphoretic, sedative, refrigerant, astringent, saline, cathartic, antiseptic, and antizymotic agents, one or more of them, according to the demand of each form and stage of the disease, are beneficial.

Of greater importance, and more useful than the medical treatment, is the prevention of it. From the peculiar construction of the larynx in hogs it is sometimes not possible to give medicine in form of a drench without their vomiting a part of it, or dying from suffocation; beside, this is not practicable with a great number of animals, and would hardly compensate for the trouble and expense necessary to secure the life

of diseased hogs. For this reason the best way is to select such remedies as the animals are apt to use willingly. The medicine should be given in a form suitable to their small appetite, and in a way that they may get an approximately full dose of it, according to their age.

IOWA.

Mr. George T. Gibbs, College Springs, Page county, says :

As I have been broken up by the so-called hog-cholera, I have come to the conclusion to give you my theory in regard to the disease. I believe the whole difficulty lies in the manner of breeding which has been practiced for the last fifteen or twenty years. We hold to the maxim that like produces like, and pay high prices for short-horns to improve our cattle and large sows for fine hogs to improve our swine, and then give the lie to our theory by our practice. The practice by most hog-raisers, and especially by those that have been supplying the country with fine stock, has been to breed their sows at the age of from six to eight months, then fatten them and breed from the pigs at the same age. I claim that this has been kept up until the constitution of the hog has been ruined, and any little thing will bring on disease, which sometimes becomes epidemic and appears to be contagious. If you breed from animals whose bodies are immature and constitutions already weakened, if like produces like, you are getting an animal weakened from infancy. The old way of breeding was to allow stock hogs to make a little bone and muscle as well as fat, to mature their bodies before allowing them to breed, and when you once got a good breeder to keep her as long as she would bear pigs. In those days we never heard of hog-cholera, and we could raise eight, ten, and twelve pigs from one sow. My father kept one sow for several years, which raised ten pigs every litter. He sold the pigs all over the county for breeders. They were not hazel-splitters either. I have helped to butcher some of this breed that dressed 250 pounds at six to eight months old, and some that were kept until four years of age weighed 800 pounds. Now hog-raisers get two or three pigs from a sow, sometimes only one. A great many object to fine stock on this account; but we can raise eight or ten pigs at a litter from thoroughbred Poland-China, Berkshire, or Chester Whites, if we treat them properly.

I expect to be laughed at by the wise and scientific, but I have watched this matter closely for the last five years, and I am satisfied I have found the true solution of the difficulty.

SOUTH CAROLINA.

Dr. C. J. Faust, Graham's, S. C., writes under recent date as follows:

I see much written in regard to hog-cholera, as it is termed in the Northwest and in our own Southern country. So far as my own observation goes I am inclined to think that Dr. J. M. Johnson, of Locksburg, Ark., is correct in regard to its symptoms, cause, treatment, and pathology. Last winter I lost ten or twelve head myself out of a herd of twenty-four. They were all in fine order.

We also had an epidemic of staggers among horses and mules in our neighborhood, which proved fatal to a great many animals. The disease generally lasts from six to forty-eight hours. An animal attacked with it rarely recovers. I lost seven head of horses myself last winter, which cost me \$1,200, and many of my neighbors lost a greater or less number. The disease known as staggers, however, was not the cause of the death of all of them. The animal, when first attacked, seems to be stiff in his fore legs, is very dull in riding, and when touched with the whip springs off very suddenly for the moment; but this is soon over. The nervous sensation seems to be very acute, and when allowed to run on an hour or so the animal does not seem to have power to lift his feet high enough to keep him from hitting them against the smallest rise on the surface of the earth or any small object in his way. He soon commences to go around in a circle, say 80 or 100 feet in diameter, and when once broken off from this circle he will go over anything in his course, and will even plunge into a dwelling. He becomes dangerous to those around him, and will go on until he is thrown down by running over some large object, when he soon dies in great agony. Our treatment has been full blood-letting, even to fainting, and copious drenching with a free purgative, composed of 300 grains of aloes, 150 grains jalap, and 80 grains of calomel, made into a bolus. This is placed upon a long paddle, two and one-half inches in width, and the paddle put down the horse's throat as far as it will go. The bolus rolls off without trouble and the animal swallows it. It soon acts thoroughly on the bowels. If this treatment should have the desired effect the horse should not be allowed to eat anything for two days, and then only bran mash and a little green food. This should be continued for several days, when the horse will begin to slowly and gradually recover.

VIRGINIA.

Mr. Charles M. Keyser, Cedar Point, Page county, says :

Having had some experience with the disease commonly called hog-cholera, I will try and relate the result of my investigations made recently. The disease was close to me and there were some cases in my immediate vicinity. About October 10th last I penned my hogs to fatten in their usual health, as I thought. About the 1st of December I found that they began to refuse some of their food, so I butchered them, and, upon examination, I found their lungs and livers in a very bad condition. The lungs were very much darkened and decayed, and the pores or small tubes were filled with worms about the size of a hair; they varied from one to three inches in length, and seemed to completely choke the hog. In color they resembled that of the kidney-worm, though they were not so large. I had no microscope and could not make a close examination. The liver was full of boils, and seemed to be in a perfectly torpid condition. The bowels seemed to be in a healthy condition.

My former experience concerning the disease is that the lungs and liver are the points most affected. The symptoms of the disease were manifested in a dull and drooping condition of the animal, coughing, and a heaving of the flanks—a beating and working like a bellows. In some instances the animals would turn quite a complete somersault and fall over dead. In other cases they would die quite easy.

I do not think there is any cure for the disease after it gets a fair hold on the animal. It seems that hogs that run at large—roam through the woods and fields—are more liable to the disease than those that are kept in clean, comfortable pens and are well cared for. The use of tar in the troughs and wood-ashes (hickory preferable) spread on the ground where they are fed, in a dry time or in a dry place, is a very good preventive, if not a cure, in some cases. They will eat some and inhale a little, which has a good effect on the animal.

PLEURO-PNEUMONIA OR LUNG FEVER OF CATTLE.

The following letter, addressed by the Commissioner of Agriculture to Hon. A. S. Paddock, chairman of the Senate Committee on Agriculture, on the 14th day of February last, gives all the facts in regard to the prevalence of pleuro-pneumonia among cattle in this country, so far as they were then known to this department:

SIR: I have the honor to acknowledge the receipt of your letter of recent date, asking for such information as may be in my possession relating to the subject of pleuro-pneumonia among cattle. The subject is one that is attracting great attention in this country at present; hence information is rapidly accumulating in this department, the more important portion of which I herewith transmit for the information of your committee. I shall first give a brief statement of the action of the department in the matter, and then submit such letters, telegrams, and other information of an important character bearing upon the subject as have recently come into my possession.

In August, 1877, within one month after my accession to the position of Commissioner of Agriculture, I instituted a preliminary examination of diseases of domesticated animals. For years I have been cognizant of the loss of immense numbers of swine and other farm animals by disease, supposed to be of an infectious and contagious character; and, with the very limited means at my disposal, I opened a correspondence with leading farmers and stock-growers in almost every county in the United States for the purpose of eliciting definite information in regard to these maladies, and the probable annual losses occasioned thereby. The result of this correspondence was the accumulation of a vast amount of important information on the subject under consideration, which, by request of the Senate, was communicated to that body on the 27th day

of February, 1878, and was afterward published as Senate Ex. Doc. No. 35.

In order that a thorough examination might be made into some of the more destructive diseases affecting farm animals, and such remedial and sanitary measures instituted as would prevent the spread of such maladies as were well known to be both infectious and contagious, an appropriation of \$30,000 was asked, and the sum of \$10,000 was granted. In my letter of transmissal to the Senate in February, 1878, the following language is used:

Our wide extent of country and its great diversity of temperature and variation of climate, the severity of frosts in some sections, and the intensity of heat in other localities, render farm stock liable to the attacks and ravages of almost every disease known in the history of domestic animals. So general and fatal have many of these maladies grown that stock breeding and rearing has, to some extent, become a precarious calling instead of the profitable business of former years. This would seem especially true as it relates to swine. Year by year new diseases, heretofore unknown in our country, make their appearance among this class of farm animals, while older ones become permanently localized and much more fatal in their results. Farmers, as a rule, are neglectful of their stock, and pay but little attention to sporadic cases of sickness among their flocks and herds. It is only when diseases become general, and consequently of an epidemic and contagious character, that active measures are taken for the relief of the afflicted animals. It is then generally too late, as remedies have ceased to have their usual beneficial effects, and the disease is only stayed when it has no more victims to prey upon.

This interest is too great to be longer neglected by the general government. Not only the health of its citizens, but one of the greatest sources of our wealth, demands that it should furnish the means for a most searching and thorough investigation into the causes of all diseases affecting live stock.

At the time this communication was made it was not known that the destructive disease known as contagious or malignant pleuro-pneumonia among cattle was prevalent to any considerable extent in any section of the country. There may have been, and no doubt were, isolated cases of the disease, but they were not sufficient in number to attract attention or cause alarm. During the past summer and fall my attention was called to the prevalence of the disease in several localities widely separated from each other. Among other letters addressed to me on the subject, I cite the following.

J. Elwood Hancock, of Burlington County, New Jersey, writes:

The prevailing disease among cattle in this county is pleuro-pneumonia. The disease is very fatal, and the losses among this class of animals from this malady have been very heavy.

Mr. J. E. Hancock, of Columbus, Burlington County, New Jersey, states that the disease has been prevalent in that county for some years. He says:

I have had some experience with pleuro-pneumonia among cattle, having lost one-third of my herd from its ravages in 1861, when I succeeded in eradicating the disease after a duration of about six months. I had a second visitation of the malady in my herd in the early part of 1866, when I lost 6 head from a herd of 23. Of the animals affected I am satisfied that not more than one-third will recover.

N. W. Pierson, Alexandria, Va., writes as follows, under date of October 12, 1878:

The principal disease among cattle in this locality is pleuro-pneumonia. The disease started from Georgetown, D. C., two years ago, and has gradually spread down the Potomac for a distance of about 25 miles, extending back from the river not more than 2 miles.

B. A. Murrill, Campbell County, Virginia, writes, about the same date:

An unknown disease has prevailed this fall among cattle in the immediate vicinity of Lynchburg, but has not spread elsewhere. [This disease was pronounced pleuro-pneumonia by competent authority.]

R. L. Ragland, Halifax County, Virginia, writes that the cattle in that county are affected with a contagious distemper which is supposed to be pleuro-pneumonia.

C. Gingrich, Reistertown, Baltimore County, Maryland, says:

Lung fever (pleuro-pneumonia) has prevailed among cattle in the vicinity of Baltimore for the past twelve or fifteen years, and the losses from the same have been quite heavy.

A report from William S. Vansant, veterinary surgeon, contained in the report of the New Jersey State board of agriculture for 1876, shows that nineteen different herds of cattle suffered from this disease in Burlington County of that State during the year above named. It would seem that while the disease has been almost constantly present in New Jersey for many years past, no organized effort on the part of the State has been made for its suppression and extirpation.

With no means at my command for the suppression of the malady, in November last I caused an examination to be made of some of the afflicted cattle in the vicinity of Alexandria, Va. The investigation was conducted by Dr. Alban S. Payne, of Fauquier County, Virginia, who, as will be seen by his report below, pronounced the disease a contagious type of pleuro-pneumonia. The results of his investigation are thus given in the following brief extract from his report:

I visited Mr. Roberts's mill, one mile south of the city of Alexandria, Va., with as little delay, under existing circumstances, as possible. I found Mr. Roberts, in connection with his other business operations, carrying on a dairy. On his farm were sixty-two milch cows, and of these forty have had pleuro-pneumonia. Twenty-two have not as yet taken the disease. I also found almost in the heart of Alexandria City two cows sick with the disease. One of these cows belonged to Mr. Townsend Baggett and the other to Colonel Suttle. I also examined about the suburbs of Washington City some sick cows. All the cases I saw were, without doubt, cases of pleuro-pneumonia of the non-malignant variety.

Knowing the insidious and destructive character of this disease, and that it was liable to assume a contagious form and cause the destruction of millions of dollars' worth of property, and interrupt and perhaps destroy one of our greatest commercial interests and sources of income, I called the attention of Congress to the existence of this fatal malady in my preliminary report, bearing date of November last, and asked the immediate intervention of the government by the enactment of measures for its suppression and extirpation. The following is a brief extract from this report:

One of the most dreaded contagious diseases known among cattle is that of pleuro-pneumonia, or lung fever. It was brought to this country as early as the year 1843, and has since prevailed to a greater or less extent in several of the Eastern and a few of the Southern States. It made its appearance about a century ago in Central Europe, and has since spread to most European countries. With the exception of rinderpest, it is the most dreaded and destructive disease known among cattle. Unlike Texas cattle fever, which is controlled in our northern latitudes by the appearance of frost, this disease "knows no limitation by winter or summer, cold or heat, rain or drought, high or low latitude." It is the most insidious of all plagues, for the poison may be retained in the system for a period of one or two months, and even for a longer period, in a latent form, and the infected animal in the mean time may be transported from one end of the continent to the other in apparent good health, yet all the while carrying and scattering the seeds of this dreaded pestilence.

Since the appearance of this affection on our shores it has prevailed at different times in the States of Massachusetts, Connecticut, New York, New Jersey, Maryland, Delaware, Virginia, and in the District of Columbia. It has recently shown itself at two points in Virginia (Alexandria and Lynchburg), where it was recently prevailing in a virulent form.

At present the disease seems to be circumscribed by narrow limits, and could be extirpated with but little cost in comparison with the sum that would be required should the plague be communicated to the countless herds west of the Alleghany Mountains.

This disease is of such a destructive nature as to have called forth for its immediate extirpation the assistance of every European government in which it has appeared, many of them having found it necessary to expend millions of dollars in its suppression. The interests involved in this case are of so vast a character and of such overshadowing importance, both to the farming and commercial interests of the country, as to require the active intervention of the Federal Government for their protection, and for this reason the considerate attention of Congress is respectfully asked to this important matter.

Prof. F. S. Billings, V. S., temporarily residing in Germany, writes under recent date as follows:

BERLIN, January 16, 1879,
14 Louise Street.

MY DEAR SIR: I intended in my last to have mentioned some ideas for your consideration upon the so-called contagious pleuro-pneumonia of cattle in the United States. I have given the subject a long-continued consideration, and it seems to me the views which now appear conformable to our case will find their approval with you. The disease is one which is rather a new thing to us, and while we find cases coming to pass in many sections, still we cannot say it has acquired any devastating extension. I truly believe that by using what means we have at command, and by fixing two or at the most three points by which cattle can be imported from Canada, and by furthermore exacting that such cattle be accompanied by attested health certificates of competent men, and furthermore that all such cattle, except when destined for immediate slaughter, be compelled to undergo twenty days of quarantine at point of entry when unaccompanied by such certificates, like rules applied to sea-ports—if we can make and enforce such regulations, then in one year at the most we can stamp the disease out of the United States and keep it out. For us the inoculation should be absolutely forbidden and severely punished. It is only of value in localities where the disease has become almost domesticated, and where of the two evils the lesser must be chosen, and that is, as is being attempted in Saxony, to inoculate every animal, and produce as soon as possible the artificial disease; all newly-introduced animals to be by law at once inoculated.

This renders the losses less severe to such a community, probably not over 25 to 30 per cent., if as much; statistics as yet are unreliable. But it is self-evident this is also the way by which the disease is rendered a constancy—it becomes domiciled, a thing we do not desire. Hence I recommend to your consideration the absolute killing of every infected and exposed animal, or, perhaps, utter quarantining—isolation of the latter under rigid inspection. The slaughtered animals to be paid for at full market price, real, not fancy, by the respective State governments, or, better, by the general government; for, if we are to have a general law, then the general government must take care of it. I earnestly recommend your bringing this to the attention of Congress, and you yourself must see the recommendation is logical and true to the country's interest. The first cost might be a little startling, but the final results equally fortunate. The rinderpest was at last reports limited and decreasing.

Your obedient servant,

F. S. BILLINGS.

To Hon. WM. G. LE DUC,
Commissioner of Agriculture, Washington, D. C.

Professor Gadsden, of Philadelphia, who recently made an examination of infected and diseased cattle on Long Island, writes as follows:

134 NORTH TENTH STREET,
Philadelphia, January 29, 1879.

SIR: I consider it my duty to report to you that the contagious disease known as "pleuro-pneumonia" exists to a frightful extent among the cows near Brooklyn, Long Island. On the return of Professor McEachran, the cattle-inspector of Canada, from Washington, he asked me to accompany him to New York State, and find out for ourselves if the report was true that a contagious disease existed. We found it too true, as at a distillery at Williamsburg we found a large byre, or cow-house, containing about eight hundred cows, with very many of them in the last stages of "contagious pleuro-pneumonia." Others had this disease in a milder form. The place was very dirty, the cows very much crowded, ceiling low, and everything favorable for the rapid spread of this disease.

The cows belong to a number of milkmen, who keep them there very cheap on hot swill (from the distillery) and hay, which increases the milk very much. This place is a regular pest-house for the disease. We were informed, on good authority, that just before the cows die they are killed and dressed, then sent into the New York market as beef, where we are told that they bring a good price because they are tender and not too fat. Others are sold, when the milk dries up, to farmers on Long Island.

This disease is very prevalent within a few miles of Brooklyn, and has been for some time. Cannot you, sir, try and stamp it out? as I am afraid if it spreads from there the English Government will not receive any cattle from our ports, as they have a law ready to put in force as soon as they are satisfied this or any contagious disease exists in cattle. I have made inquiry from several veterinary surgeons in this State; they all answer there are no contagious diseases in cattle in their district. I have no reason to believe there is any in Pennsylvania or in the Western States; so I do hope this disease on Long Island will not interfere with the sending of live cattle from Philadelphia to England, as I know they are making great preparations for this spring's trade.

Respectfully, &c.,

J. W. GADSDEN, V. S.

Hon. WM. G. LE DUC,
Commissioner of Agriculture.

On the morning of the 30th of January, 1879, the following telegrams appeared in the metropolitan journals:

TORONTO, ONTARIO, *January 30.*

Intelligence of the slaughtering of cattle lately shipped to Liverpool on a steamship creates an anxious feeling among dealers here. On or about the 14th instant the steamship Ontario sailed from Portland for England with a cargo of cattle, the shippers being Messrs. T. Crawford & Co., of this city. The cattle numbered 265 head, and were, according to Mr. Crawford's statement, in sound condition, having been examined by competent men at both Montreal and Portland. The Ontario reached Liverpool on Sunday last, and on the following day Messrs. Crawford & Co. received a cable dispatch from their agent there that the cattle had been detained for inspection by order of the British Government. This inspection was evidently attended with unsatisfactory results, for on Tuesday the agent cabled that the cattle had been condemned on account of disease and were to be slaughtered. The disease was said to be pleuro-pneumonia. The Toronto Exportation Company and Messrs. Crawford & Co., the two firms that do the largest shipping business in their line in the city, were instructed by their agents to ship no more. The first named have a cargo of 170 head on the steamship State of Alabama, which it is anticipated will arrive at Liverpool on Friday next. What will become of these remains to be seen. The general feeling is that it is not at all likely that a trade which was rapidly becoming a necessity for England will be allowed to suffer interruption for any great length of time without a good cause for the embargo being adduced.

OTTAWA, ONTARIO, *January 30.*

Information having been received that the British Government has totally prohibited the importation of cattle from the United States, the cabinet met last evening to consider the situation. The result of the meeting was the adoption of a resolution that steps would be taken to prevent any injury being done to Canada.

MONTREAL, QUEBEC, *January 30.*

Considerable anxiety exists in regard to the order from the imperial government prohibiting the importation of Canadian cattle into England. It is said if the order is continued cattle will be slaughtered here and the meat will be taken across in refrigerators.

The following letter from the president of the American Veterinary College will explain itself:

AMERICAN VETERINARY COLLEGE,
New York, February 1, 1879.

SIR: In returning from Washington, where he had the honor of seeing you, Professor McEachran, of Canada, asked me if pleuro-pneumonia was to be found in New York State. I took him to Long Island, and there had the opportunity to show him a barn where a large number of cows (some 600) are kept, and where we found ourselves in the difficult task, not to detect diseased animals, but to discover healthy cows. *Post mortems* confirmed our diagnosis, so that no doubt can be had of its correctness.

The milk and the carcasses of these diseased subjects find their way to our market in New York City. Our boards of health have no veterinarian to detect the disease and enforce the laws! Our market meat-inspectors are deficient in detecting diseased from healthy meat! Our cattle are exposed to the spreading of that fearful disease! Our exportation is now impeded to such extent that to-day I am told animals exported to France even must have a clean bill of health, and England is threatening closing her ports to our stock!

May I respectfully be allowed to call your attention to this state of affairs, and to

place myself at your orders for whatever professional assistance I may be able to give your department in overcoming this great danger to our European cattle trade and to our own live stock.

I am, sir, your obedient servant,

A. LIAUTARD.

Hon. W. G. LE DUC,
Commissioner of Agriculture.

On the 4th instant I received the following telegram from Mr. J. B. Sherman, superintendent of the Chicago Union Stock-Yards:

UNION STOCK-YARDS, Chicago, Ill., February 4, 1879.

THE COMMISSIONER OF AGRICULTURE:

The most important blow struck at the interest of this city, State, and Northwest is the report in circulation in reference to the prevalence of cattle disease in the West, and these reports are absolutely false. I have sent a telegram to the Secretary of State, on whom I wish you would at once call.

This business of the export of live cattle to England has developed immense proportions in the last year, and we must not, cannot, remain quiet and see it destroyed. It is worth millions to the country, and affects directly every farmer in the Northwest, while the whole country feels the effect of this large increase in its exports. The action of the British and Canadian Governments is based on a misconception of the facts, and we need such dual investigation as will put the matter at rest.

J. B. SHERMAN,
Superintendent.

To which the annexed reply was at once forwarded:

DEPARTMENT OF AGRICULTURE,
Washington, D. C., February 4, 1879.

J. B. SHERMAN,
Superintendent Union Stock-Yards, Chicago, Ill.:

The disease to which your telegram refers appeared in this country as early as 1843, and there is no more reason for the present action of the British Government in this matter than has existed for years past. Pleuro-pneumonia has never troubled the cattle-breeders of the West, from whence alone cattle for exportation are derived, but the existence of the disease on our eastern coast at all is a constant threat to the cattle-raising country beyond the Alleghany Mountains, for the extermination of which I have asked authority of Congress. I hope and expect that action will be taken that will speedily remove all excuse for the objectionable orders of the British Government.

WM. G. LE DUC,
Commissioner of Agriculture.

On the recommendation of gentlemen largely interested in the live-stock trade, I at once made the following appointment of an examiner for the port of New York:

DEPARTMENT OF AGRICULTURE,
Washington, D. C., February 5, 1879.

SIR: You are hereby appointed an examiner, and directed to make as thorough inquiry and examination as the owners and shippers of stock will permit into the condition of the live stock sent, or about to be sent, from your port, and certify daily to this department the health of each particular shipment, so far as possible, examining particularly as to pleuro-pneumonia in cattle, and noting the presence or absence of this disease in each case. You are authorized to give a copy of your certificate for the department to the shippers, if desired.

WM. G. LE DUC,
Commissioner of Agriculture.

Dr. JOHN J. CRAVEN,
Jersey City, N. J.

I also forwarded a like appointment by telegraph to H. J. Detmers, V. S., Chicago, Ill., and received prompt replies from both accepting the positions tendered.

These examiners were also directed to furnish a certificate of health to such shippers of live stock as might desire it, a copy of which is herewith appended:

INSPECTION OF CATTLE FROM THE PORT OF ———, AUTHORIZED BY THE UNITED STATES GOVERNMENT, AND UNDER THE IMMEDIATE DIRECTION OF THE COMMISSIONER OF AGRICULTURE.

This is to certify that I have this day inspected ——— beef cattle, owned by Messrs. ———, to be shipped by them upon ——— sailing February —, for the port of Liverpool, England, and found the animals sound.

Dated February —, 1879.

(Signed)

Inspector.

These letters were promptly followed by the following, addressed to the Secretary of the Treasury, informing him of the action taken by this department:

DEPARTMENT OF AGRICULTURE,
Washington, February 5, 1879.

SIR: I have the honor to inclose for your information a copy of a letter this day addressed to Dr. John J. Craven, of Jersey City, N. J. I have also telegraphed to Dr. Detmers, of Chicago, substantially the same instructions as are noted in Dr. Craven's letter.

So far as the limited funds at the command of the department will permit, the proposed examinations will be continued, with the view of furnishing shippers information relative to the health of the stock, and thus prevent the shipment of any that are diseased; and the certificate of the veterinary surgeon of this department making the examination will be in the nature of a "bill of health," and should go far towards allaying any apprehensions, real or fancied, which may be entertained by persons who receive the stock.

This department is ready to second any efforts made by the Treasury Department to quiet the unnecessary excitement now apparent in Europe and in our own country on this subject.

Respectfully, your obedient servant,

WM. G. LE DUC,
Commissioner.

Hon. JOHN SHERMAN,
Secretary of the Treasury.

To which the following reply has been received:

TREASURY DEPARTMENT,
OFFICE OF THE SECRETARY,
Washington, D. C., February 7, 1879.

SIR: I am in receipt of your letter of the 5th instant, inclosing a copy of one addressed by you to Dr. John J. Craven, of Jersey City, N. J., authorizing him to make inquiries into the condition of live stock about to be sent from that port to foreign countries, and to certify daily to your department the health of each particular shipment as far as possible.

I inclose herewith for your information twelve copies of a circular issued by this department, under date of the 1st instant, requiring as a condition precedent to the shipment of live cattle abroad an examination thereof by the customs-officers with reference to their freedom from disease, and the issuance of a certificate by the collector that they are free from such disease, if the facts shall be found to warrant it.

Doubtless Dr. Craven, and any other person appointed by your department for the purpose named, could give valuable aid to the collectors of the ports from which such shipments are made, and this department would be pleased if you would instruct the experts selected by you to afford aid to the customs-officers in this respect as far as possible.

You will see that the circular requires that the officers of the customs shall also furnish this department from time to time such information upon the subject as they may be able to procure, and I would be pleased if you will also forward such information as you receive it.

This department has furnished the State Department with copies of the circulars before mentioned, and the Secretary of State has doubtless furnished them to the proper representative of the British Government.

This department perceives the importance of protecting its export trade in live animals as far as possible, and will do all in its power to attain the desired object.

Very respectfully,

JOHN SHERMAN,
Secretary of the Treasury.

Hon. WM. G. LE DUC,
Commissioner of Agriculture.

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The following is a copy of the circular inclosed by the Secretary of the Treasury:

[Circular.]

INFORMATION IN REGARD TO CATTLE DISEASE.

TREASURY DEPARTMENT,
Washington, D. C., February 1, 1879.

To collectors of customs and others:

By department's circular of December 18, 1878, it was directed that live cattle shipped from the various ports of the United States might be examined with reference to the question whether they were free from contagious diseases, and that, if found to be free from such diseases, a certificate to that effect should be given.

By that circular such inspection was not made compulsory, but the certificate was to be issued only upon the application of parties interested.

As the export trade in live cattle from the United States is of vital importance to large interests, every precaution should be taken to guard against the shipment of diseased animals abroad, and such a guarantee given as will satisfy foreign countries, especially Great Britain, that no risk will ensue from such shipments of communicating contagious or infectious diseases to the animals in foreign countries by shipments from the United States.

Collectors of customs are, therefore, instructed that in no case will live animals be permitted to be shipped from their respective ports until after an inspection of the animals with reference to their freedom from disease, and the issuance of a certificate showing that they are free from the class of diseases mentioned.

Notice of rejected cattle should be promptly given to this department.

In order that this department may be fully informed in regard to such diseases in any part of the United States, collectors of customs are requested to promptly forward to this department any information which they may be able to obtain of the presence of contagious or infectious diseases prevailing among live animals in their vicinity.

It is probable that if the disease prevails to any considerable extent it will be noticed in the local press, and collectors are requested to send copies of any such notices to this department for its information.

JOHN SHERMAN,
Secretary.

The following letter has been received from Prof. James Law, who, it will be seen, has been ordered to the port of New York by the governor of that State:

ASTOR HOUSE, New York, February 8, 1879.

DEAR SIR: I came down here last night in accordance with instructions from the governor of New York to ascertain and report as to the existence of the lung fever in cattle. From what I have seen to-day I have no doubt of its existence in Kings and Queens Counties, but I hope very soon to be able to report on the *post-mortem* lesions as well as the *ante-mortem* symptoms.

I hear that the malady exists in Watertown, Conn., perhaps at Ratonah, Westchester County, New York, and around Newark, N. J. The two first places I expect to visit in the interest of New York, and I shall find out what I can about the vicinity of the shipping yards for the stock exported to Great Britain. Would it be well for me to visit Newark also before returning?

I strongly commend the position you have taken in this matter, as the only just and tenable one. If we should ever suffer from a temporary suspension of the foreign trade in cattle, it will be well expended if it should lead to a thorough extinction of the lung plague in the United States.

Yours, very truly,

JAMES LAW.

HON. WM. G. LE DUC,
Commissioner of Agriculture.

The following late telegrams, showing the action of the British Government, are appended:

THE AMERICAN CATTLE TRADE—NO FURTHER INTERFERENCE EXPECTED.

LONDON, February 8.

A committee of the Cattle Trade Association at Liverpool, in order to avoid interruption to the trade, have offered to erect the necessary lairage and abattoirs to comply with the requirements of the Privy Council. It is believed, however, that, in consequence of the growing importance of the trade to Liverpool, either the authori-

ties or the corporation or the dock board will undertake the work. All arrivals of cattle from America since the steamer Ontario's cargo have been found entirely free from disease. The severity of the weather, therefore, it is believed caused the outbreak in that instance. The British Government is, under the circumstances, not inclined to interfere with the importation of cattle from America, provided there is adequate inspection before shipment and provision of the required lairage at Liverpool to put them in position to meet such cases as the Ontario's. It is not believed that slaughter on the quays will be enforced where no disease exists. Persons in the trade say that under these conditions American shippers need not fear any interference with the business.

LONDON, February 9.

In regard to the importation of cattle from America, no action of the Privy Council has been made known since the notice read in the Liverpool town council on February 5, that cattle cannot be landed at the Liverpool docks after March 1, unless provision is made for slaughter on the quay.

THE CATTLE EXPORT TRADE—EFFECT OF THE BRITISH ORDER IN COUNCIL.

LIVERPOOL, February 11.

The order of the Privy Council adopted yesterday revoking after March 3, 1879, article 13 of the foreign animals order so far as it relates to the United States was a great surprise to the trade here. All cattle from the United States after March 3 will have to be slaughtered in abattoirs now being prepared on the dock estates of Birkenhead and Liverpool within ten days after landing.

I also forward you articles on the subject of pleuro-pneumonia, clipped from the National Live Stock Journal of March, 1878, and November, 1878, from the pen of Dr. James Law. They were inclosed to me and my attention directed to them by Mr. J. H. Sanders, the able editor of that Journal.

[From the National Live Stock Journal of March, 1878.]

THE GREATEST DANGER TO OUR STOCK—THE LUNG FEVER—CONTAGIOUS PLEURO-PNEUMONIA.

The Journal has frequently called attention to the great dangers that beset our live stock from imported plagues of foreign origin. During the past year the sudden invasion of Western Europe and England by the rinderpest roused the agricultural community from their dream of safety, and called forth from the Treasury an order remarkable alike for its promptitude and good intentions, and for the fatal blunders which rendered it worse than a dead letter. Once more there seems a prospect of a renewal of these apprehensions, the Russo-Turkish war having led to an extension of this cattle plague into Hungary, from which the Atlantic coast and Great Britain may be any day infected, owing to the activity of the stock trade. Should this unfortunately take place, it will find us no better prepared than we were a year ago, and our Treasury order, now in force, will freely invite the disease to enter, provided it makes its advent respectably—in the systems of *blooded stock*, and not in poor cross-bred animals, which it would be ruinous to import, even if sound. A similar welcome is extended, by implication, to all those ruminants which are devoted more particularly to luxury, and have not been degraded to such vulgar utilitarian objects as the production of meat or wool. Yet all ruminants are subject to rinderpest, and this malady was carried to France, in 1866, by two gazelles, as other plagues have often been carried to new countries by the privileged *blooded stock*.

But we started out to notice a danger which is no longer separated from us by the broad barrier of the Atlantic, and whose malign presence is not to be dismissed by any one of ten thousand contingencies, as is the case with the possible advent of the rinderpest. This danger stands in our midst, and is steadily gaining in force as it encroaches further and further, showing how certain it is, if unchecked, to lay the whole country under contribution, and inflict most disastrous and permanent losses. The lung fever of cattle, imported into Brooklyn, L. I., for the first time, in 1843, in a Dutch cow, has never since been at any time entirely absent from our soil. From this center it has slowly and irregularly extended over a portion of New York, New Jersey, Pennsylvania, Maryland, Delaware, and Virginia, besides having repeatedly invaded Connecticut. The slowness of its extension has begotten a false sense of security, and no real apprehensions of serious consequences remain from an animal poison which has been for over a third of a century hidden away in the near vicinity of the Atlantic coast.

To disturb this comfortable and restful condition of the public mind is an unpleasant

task, which nothing but the imperative sense of duty would compel us to undertake. But this disease has a history, which we can only ignore at our peril; and as its records can now be drawn from all quarters of the globe, we can have before us an unequivocal testimony as to what will inevitably happen under given conditions of climate, surroundings, and treatment.

England imported the lung fever of cattle in 1842, just one year before we did, was soon very generally infected, and has continued so to the present time. Up to 1869, it is estimated that England had lost, almost exclusively from this disease, 5,549,780 head of cattle, worth £83,616,854 (say \$400,000,000). For the succeeding nine years, up to 1878, the losses have been, in the main, as extensive, so that we may set them down as now reaching at least \$500,000,000 in deaths alone, without counting all the contingent expenses, of deteriorated health, loss of markets, progeny, crops, manure, &c., disinfection, quarantine, &c. With us no attempts have been made to estimate the losses, but they cannot exceed an inconsiderable fraction of those above named; and thus we have slept on in a pleasant dream of immunity.

It is even alleged that the disease has, in a great measure, been shorn of its virulent power, by being transplanted to the shores of the New World, and that we may comfort ourselves with this, and continue to ignore its presence. If, on the other hand, it can be shown that the difference is in no material respect affected by climate, but altogether determined by the surroundings, it will be well for us to attend to the facts of the case, and face the real danger. The lung fever, which had really entered England, by a special importation, some time before the free trade act of 1842, was, by virtue of this act, thrown upon her in constantly accumulating accessions. The ports at which the continental cattle were landed, and the markets in which they were sold—London (Smithfield Market), Southampton, Dover, Harwich, Hull, Newcastle, Edinburgh, &c.—insured the mingling of the imported stock, week by week, with the native store cattle. Then, if they failed to find a profitable sale, they were sent by cars to other and inland markets, where they were again and again brought into contact with numerous herds of store cattle, by which the germs of the disease were taken in, and carried all over the country.

With us, on the other hand, the disease was long confined to the dairies of Brooklyn and New York, where the cows were kept until they died, or were fattened for the butcher. A few doubtless found their way to the country, and by these the disease was carried to different farms, which were thus constituted centers of contagion from which the adjacent country became infected. But any such movement from the city dairies was necessarily of the most restricted kind, and it never took place to any great distance. It would have been folly to move a common milk cow, worth \$40 to \$70, to the West, where she could be bought for one-half or one-third of that sum. The same deterrent condition existed in the case of the farms on which the diseased city cows had been brought. Sales were no doubt occasionally made from infected herds, to secure the apparent value of an animal which the owner had good reason to believe to be doomed, and as such animals would, for obvious reasons, be sent as far from home as possible, this became a principal means of the formation of more distant centers of contagion and the wider diffusion of the malady. But with us the disease has hitherto had to fight against the heaviest obstacles—the current of cattle traffic having been almost without exception from the cheaply-raised herds of the West to the profitable markets of the East. The exceptions have only been in the case of thoroughbred stock, and hitherto our Western stock has escaped contamination by this means.

The wonder is not so much that the plague has failed to reach the West, but that in the face of such tremendous obstacles it has succeeded in invading all of the six or seven States that are now infected. In Great Britain, where some would have us believe that the disease is more virulent, we can point to a more satisfactory record. There the great body of the country has been infected for thirty-five years, but the greater part of the highlands, exclusively devoted to the raising of cattle and sheep, has enjoyed the most perfect immunity. Here, under nearly all possible predisposing causes of lung disease—altitude, exposure, cold, chilling rains, and fogs, the piercing blasts of the Atlantic and German Oceans—this contagious lung disease has never penetrated, though severely ravaging the lowlands immediately adjacent. The explanation is, that these hills support none but the native black cattle, and other breeds are never introduced. In spite of the alleged virulence of the disease in England, it has proved powerless to enter this magic circle from which all but the native stock is excluded. The same holds true concerning some parts of Normandy, Brittany, the Channel Islands, Spain, Portugal, Norway, Sweden, &c.

The fact that the disease has maintained a foothold among us for thirty-four years, and in spite of all obstacles has made a slow but constant extension, is sufficient ground for the gravest apprehensions. A disease-poison which shows such an obstinate vitality and such persistent aggressiveness cannot be allowed to exist among us without the certainty of future losses which will eclipse those of Great Britain by as much as our herds of cattle exceed those of that nation. A recent outbreak in Clinton, N. J., caused by a cow brought from Ohio, suggests the possibility of the disease

having already reached the latter State; an occurrence which was inevitable sooner or later, but the actual existence of which must enormously increase our dangers. With every such step westward there is the introduction of more diseased and infected cattle into the natural current of the traffic, and the earlier probability of the general infection of all parts to the east of such ultimate centers of disease. There is, further, the infection of more cattle cars, which, carried West, may be the means of securing a rapid extension of the plague to our most distant States and Territories.

RELATIVE DANGERS OF THE POISONS OF LUNG FEVER AND OTHER PLAGUES.

The persistent vitality of the *lung-fever poison*, in comparison with that of any other animal plagues, is noteworthy. It has held a tenacious grasp on the United States for over a third of a century, though forbidden by circumstances to make a wide extension. *Aphthous fever* (foot and mouth disease), on the other hand, though twice imported into Canada within the last ten years, and on one occasion widely spread in New York and New England, was on each occasion easily and early extinguished, and with little or no effort on the part of the States. It might indeed almost be said to have died out of itself. Even the dreaded *rinderpest* has its poison early destroyed by free exposure to the air, in thin layers, at the ordinary summer temperature. Numerous experiments on hides hung up and freely exposed in warm weather have shown that the infecting power is lost as soon as they are quite dried. But the poison of lung fever maintains its virulence for months in the dry state in buildings, and we have known parks, with sheds, that proved regularly infecting year after year to all cattle turned into them. In other cases we have known the virus carried for miles on the clothes of attendants, and thus introduced into new herds.

A far greater danger lies in the lengthened period during which the poison of lung fever remains dormant in the system. This averages about three weeks or a month, but may extend, in exceptional cases, to not less than two months. An ox or a cow which has been exposed to the contagion may, therefore, be carried from one extremity of the continent to the other, may be exposed in a succession of markets, and may change hands an indefinite number of times, and be all the while in the best apparent health, though infallibly approaching the manifestation of the disease, and for the latter portion of the time spreading the germs of the malady to others. There is here an opportunity for the unscrupulous to sell off exposed and infected animals without the purchaser having the least suspicion of foul play. There is also the strong probability of animals that have contracted the disease by accident, in cars or otherwise, in passing to a new home, mingling with the herd of the new owner and infecting them extensively before there is a suspicion that anything is amiss. This long period of incubation after the animal is infected, and the equally long period of latency of the malady in animals he has infected, one or two of which only will be attacked at intervals of a month, lull suspicion as to the presence of contagion, and it is too often only after great damage has been done that the truth dawns on the mind.

In aphthous fever and rinderpest, on the other hand, the disease shows itself in from one to four days after infection, and the surrounding animals are so rapidly attacked after the coming of the infected stranger, that there is no room for hesitancy as to the existence of contagion. Nor can the victims of these diseases be carried far from the point where they have been infected and disposed of as sound animals; so that in the very vigor and promptitude of their action we have an excellent basis for their restriction and control.

DANGER OF INFECTION IN OUR UNFENCED STOCK RANGES.

It is needful to note the above-named insidious progress and stealthy invasions of the lung fever, and to contrast them with the more prompt and open manifestations of the other animal plagues, in order to show the great peril to which we are subjected by the presence in our midst of a *pestilence* which literally *walketh in darkness*. Let us now consider the prospective infection of our great stock ranges. That this is inevitable, though slow, at the present rate of progress of the plague, has been sufficiently shown. That it might occur any day by an animal infected in an Eastern farm or stock-yard, or in a railroad car in which it was sent for the improvement of the Western herds, must be abundantly evident to every one who has read this article. If we now add the fact that more than one *thoroughbred Ayrshire* and *Jersey* herd has been infected with this disease during the past year, we are at once confronted with a strong probability of an early Western infection. Let us remember that thoroughbreds alone are carried West for improvement of native herds, and that a bull of the Ayrshire, Jersey, Holstein, or short-horn breed, taken from a herd now or recently infected, may be carried to any of our Western Territories and mingle for a month with the native herds before his own infection is so much as suspected, and we can conceive how imminent is the danger when the infection has reached our *Eastern thoroughbred cattle*.

To illustrate the result of the infection of our unfenced stock ranges, I must quote

another page from the history of this disease in other countries. The instance of Australia is the most recent as well as the most striking. The lung fever was introduced into Melbourne in 1853, by a short-horn English cow, which died soon after landing. Having been confined to an inclosed place, there is every reason to believe that with her the disease would have ended, had not a teamster turned his yoke of oxen into the infected park under cover of the night. These oxen working on the streets infected others, the disease soon spread to the open country, and the mortality increased at an alarming rate. Vigorous measures for its suppression were adopted, thousands of infected and diseased cattle were slaughtered, but all proved of no avail. Not only were the free, roaming herds infected, but so many places were contaminated that it was soon perceived that help from this source was not to be expected. Destroy a whole infected herd, and you still left the infection in the station from which, in its unfenced state, other herds could not be excluded, and where they were certain to take in the germs of the malady. After enormous losses had been sustained by the combined operations of the pest and the pole-ax, it was concluded that the remedy was worse than the disease, and the colonists reluctantly fell back on the expedient of inoculation. This is based on the fact that the disease is rarely contracted a second time by the same animal, and it can be practiced on all calves with losses at the rate of from two to five per cent. only, so that the mortality is insignificant as compared with the thirty to fifty per cent. which perish where the affection is contracted in the ordinary way. The great objection to inoculation is, that it can only be practiced at the expense of a universal diffusion of the poison, and of its maintenance in a state of constant activity and growth. With such a universal diffusion of the virus, the stock owners are virtually debarred from introducing any new stock for improving the native breeds, or infusing new vigor or stamina, inasmuch as such new arrivals would almost certainly fall early victims to the plague. Australia, therefore, now suffers from the permanent incubus of the lung plague, and can only import high-class cattle at great risk.

This is an occurrence of yesterday, but it is only a repetition of the immemorial experience of the steppes of Russia. There we find the same conditions of great herds roaming free over immense uninclosed tracts, and all the facilities for an easy and wide diffusion of animal poisons. There, accordingly, we find the home, in all ages, of the animal plagues of the Old World. To these endless steppes Europe and European colonists owe their frequent invasions of *lung fever*, *rinderpest*, *aphthous fever*, and *sheep-pox*. To these are to be charged the losses, to be estimated only by many thousands of millions, which have repeatedly fallen on the other civilized countries of the world. From these steppes the disease has spread over the continent on the occasion of every great European war, dating from the expulsion of the Goths from Hungary by Attila and his Huns, in A. D. 376, down to the present Turkish war, which has secured the extension of the rinderpest to Hungary at least. On these steppes, too, the Russian veterinarians believe the rinderpest, at least, to be an imported disease derived from Eastern and Central Asia, yet all their efforts to crush out this or the lung fever, though receiving the freest support from the Russian Government, have failed. The same conditions exist, to a large extent, at the Cape of Good Hope; and there, too, the lung fever, imported in 1854, has acquired a permanent residence.

PREVENTIVE MEASURES DEMANDED.

Such is the history. Now comes the question pregnant with weal or woe to our future stock, agricultural, and national interests: Shall we learn from the disastrous experience of others and extirpate the lung plague from the United States while it is still possible, or shall we sit quietly by with folded hands and await the inevitable, early or late, infection of our open Western stock ranges, and then repeat, for the benefit of other nations, the already twice-told tale of a desperate and extravagant but fruitless attempt to suppress a plague which we have criminally allowed to pass beyond our control? With or without a prodigal but vain effort to crush out the poison, the results may be thus summed up: The infection of stock-yards, loading-banks, cars, and markets, and a general diffusion of the plague over the Eastern States. This would imply a national loss, by cattle disease, like that of England, but much more extensive in ratio with our great numbers of stock. Thus England, with her 6,000,000 head of cattle, has lost in deaths alone from lung fever in the course of forty years over \$500,000,000. We, therefore, with our 23,000,000, should lose not less than \$2,000,000,000 in the same length of time, allowing still a wide margin for the lower average value per head in America. And this terrible drain is for deaths alone, without counting all the expenses of deteriorated health in the survivors, of produce lost, of loss of progeny, of loss of fodder no longer safe to feed to cattle, of diminished harvests for lack of cultivation and manure, of quarantine and separate attendants whenever new stock is brought on a farm, of cleansing and disinfection of sheds and buildings, &c., which become absolutely essential in the circumstances.

We do not include the expense of supervising the trade, examining and quarantin-

ing the stock at the frontier of every State, and of the disinfection of cars, loading-banks, stock-yards, and markets. If such were resorted to, after an extensive infection of our Western herds by lung fever, the cattle trade would be virtually stopped. Thus a safe quarantine for store cattle could not be less than three weeks, and a registration and supervision for five weeks more on the farms to which they are taken, would be absolutely essential. Thus the quarantine yards and sheds would be continual centers of infection, and would require to be very extensive, thoroughly isolated from each other, and constantly and perfectly disinfected, the air as well as the solids, to prevent the infection of newly-arrived stock. Such an incubus upon the trade would amount to a virtual prohibition. In rinderpest, sheep-pox, and aphthous fever, quarantine is a comparatively simple and available expedient, as the disease shows itself within a week; but, in lung fever, with the germs lying unsuspected in the system for one or two months, a protective quarantine is practically impossible wherever an active cattle trade is carried on. Hence in the countries of Central and Western Europe, through which the active traffic from the East is carried on, a complete control is usually maintained over rinderpest and sheep-pox, while the peoples have resigned themselves to the prevalence of lung fever as an unavoidable infliction. The same holds in Great Britain. Twice within eleven years has she crushed out invasions of rinderpest, and repeatedly has the same thing been accomplished for sheep-pox; but the lung fever is accepted as a necessary evil, between which and her large importations of continental cattle she must make a deliberate choice.

Happily, in these United States we are as yet under no such compulsion. The lung fever on American soil is still confined to the Eastern States and to inclosed farms, from which it is quite possible to eradicate it thoroughly. Of this possibility we have abundant evidence, alike in the Old World and the New. In several countries of Western Europe, through which there is no continuous cattle traffic between nations on opposite sides, this disease has been killed out and permanently excluded by an intelligent veterinary sanitary supervision. Sweden imported the disease in Ayrshire stock in 1847, but at once circumscribed the infected herds and places, slaughtered the diseased, disinfected all with which they had come in contact, and promptly extinguished the outbreak. Denmark, invaded the same year from a similar source, and on several subsequent occasions from Holland and England, as often quenched the poison by analogous measures. Oldenburg, Schleswig, and Norway, successively invaded by the importation of infected Ayrshires, in 1853, 1859, and 1860, respectively, enjoyed a similar happy riddance, through the application of the same system of suppression. Switzerland, long slandered as the native home of the lung plague, has at last awoke to the truth of the statement of the immortal Haller, made more than a century ago, that this disease only occurs "when an animal has been brought from an infected district"; and, by the judicious use of suppressive measures, has permanently rid the country of the pestilence, and demonstrated that their Alpine air is as clear and wholesome for beast as for man.

In America, Massachusetts and Connecticut have furnished examples equally striking. The former imported the disease in Dutch cattle in May, 1859. In April, 1860, when it had gained nearly a year's headway, an act was passed, and a commission appointed, with full power to extirpate it. After the slaughter of 932 cattle, it was believed that this had been achieved; but new centers of infection were discovered in the two succeeding years, and it was not until 1865 that the commonwealth was purged of the poison. Since that year the lung fever has been unknown in Massachusetts. Connecticut has had a similar experience. Her proximity to New York City and Long Island has brought upon her a series of invasions; but, profiting by the experience of her neighbor, she has, on each occasion, grappled successfully with the enemy, and driven him from her midst.

What has been done by the Scandinavian nations, by Oldenburg and Switzerland, by Massachusetts and Connecticut, can be done by all of our Eastern States. On this point the teaching of history is as unequivocal as on the certainty of the irreparable results if our open Western stock ranges were infected. The one indispensable prerequisite to success is the vigorous and simultaneous action of the various infected States, and its persistent maintenance until the last infected beast has disappeared and the last contaminated place or thing has been purified. It matters little whether controlled by State or national government, if vigor and uniformity of action can be secured; but, as such combined and unflagging work is necessary, it could be best controlled by an intelligent central authority. The United States Government is as much called upon to defend her possessions against an enemy like this—so implacable, so relentless, and so certain, if not repelled, to lay us under an incubus which will increase with the coming centuries, and dwarf the prosperity to which we are entitled—as against the less insidious one who attacks us openly with fire and sword. Let the national Congress consider this matter well. Let every stock-owner press it upon his Representative as a matter that cannot be safely ignored even for a single day. Let boards of agriculture, farmers' clubs and conventions, granges, and all citizens who value the future well-being of the nation, unite in a strong representation on the sub-

ject. If the present Congress should neglect it, let citizens make it a test question to every future candidate for their suffrages, and elect only such as are pledged to carry suppressive measures into effect. The danger threatens all classes alike, though the first sufferers will be the stock-owners; for every tax upon production necessarily enhances the value of the product; and, as agricultural progress must be seriously retarded, the tax will not fall upon meat alone, but upon every product of the farm. Nothing can excuse a continued neglect of this subject, the dangers surrounding which increase from day to day, and the final results of which, if once it reaches our Western and Southern States and Territories, can only be computed by the prospective increase of our population and our herds of cattle. For this is not like an evil preying on our currency, banking, trade, or manufactures, the full extent of which may be, in a great measure, seen from the beginning, and the repair of which may be at any time inaugurated by legislative enactment. The animal plague only increases its devastations as we increase the numbers of our herds, and threatens soon to acquire an extension to which no legislation can oppose a check, and a prevalence in the face of which the most desperate efforts of the nation will prove of no avail. Thus our cattle are increasing at the rate of 13,500,000 every ten years, so that by the end of this century they may be exactly doubled, with a prospective loss, if our Western and Southern ranges are infected, of \$130,000,000 yearly in deaths alone.

The choice is now in our power. So far as we know, our stock-raising States and Territories are still unaffected. We can still successfully meet and expel the invader; next year it may be too late.

[From the National Live Stock Journal of November, 1878.]

OUR GOVERNMENT AND THE ENGLISH CONTAGIOUS DISEASES ACT.

By an Associated Press dispatch from Washington we learn that "The Secretary of State has been officially notified of the passage of an act by the British Parliament entitled 'The Contagious Diseases (Animal) Act, 1878,' under which, except in the case of countries specially exempted by the Privy Council, in whole or in part, from the operations of the act, all animals landed from abroad in any part of the United Kingdom will, after the 1st of January next, be slaughtered at the port of debarkation. The British Government has also notified Secretary Evarts that, in case the United States desire to be exempted from the operations of the act, the lords will require a statement of the laws which regulate the importation of animals into this country, and the method adopted to prevent the spreading of any contagious disease when it exists in any part of the United States. Secretary Evarts has sent a copy of the act of the British Parliament to the Secretary of the Treasury, in order that he may furnish the desired information preliminary to any action being taken to have the animals shipped from the United States into the United Kingdom exempted."

We think it will puzzle the Secretary of the Treasury to find *any* methods that have been adopted by our general government "to prevent the spreading of any contagious disease when it exists in any part of the United States"; and if he will take the trouble to investigate the matter pretty thoroughly, he will find that *all* the regulations that have from time to time been ordered by his department to prevent the introduction of contagious and infectious diseases into the United States from foreign countries are practically worthless. When this fact comes to be reported to the British Government, it is not unlikely that the exemption which the United States now enjoys from the operation of the act will be revoked, notwithstanding our present comparative freedom from any diseases likely to be transmitted by exportation to England. When this condition of things is brought about, and the business of exporting fat cattle, sheep, and swine from this country to England—which has, within the past few years, grown to such enormous proportions and exercised so powerful an influence upon prices in this country—comes to a sudden halt, we shall expect such a pressure to be brought to bear upon Congress as will compel the passage of some such act as that introduced into the House last May by Hon. J. S. Jones, of Ohio, to which reference was made in these columns in June last.

But it is wise in us to await unfavorable action on the part of the British Government before taking such steps as will preclude all probability of this country being included in the prohibition? Clearly, the interest is too large, and the effect of adverse action on the part of the Government of Great Britain upon our farming community would be too disastrous, to justify us in taking any chances in the matter. The regulations now provided by law against the importation of plagues and infectious diseases from abroad are confessedly worthless; and as for the stamping out of such diseases when they do make their appearance, we have absolutely no law that is general in its operation. A few of the States have attempted it on their own account, but most of them have no laws at all upon the subject, and none can be effectual without the sanction of our general government; for Congress alone has the power to regulate commerce with foreign nations and between the several States.

It is imperative that early and efficient action be taken by our Congress upon this

matter, if we would not have our present lucrative trade in fat cattle and sheep with England seriously crippled. Members of Congress are now at home among the people, and such a pressure ought to be brought to bear upon them as will compel them to act upon this question as soon as they reassemble at Washington.

In addition to the foregoing, I inclose you copies of the laws passed by the legislatures of Massachusetts and New York for the suppression and extirpation of the disease during its prevalence in those States, and the rules adopted and enforced by the British Government for the extirpation of this and other contagious diseases among farm animals in its Indian possessions.*

All of which is respectfully submitted.

WM. G. LEDUC,
Commissioner of Agriculture.

Hon. A. S. PADDOCK,
Chairman Senate Committee on Agriculture, Washington, D. C.

Since the publication of the above letter (Senate Mis. Doc. No. 71, Forty-fifth Congress, third session), many additional facts in relation to the prevalence of this disease, and the measures taken to suppress, and, if possible, eradicate it in the various localities in which it has been found to exist, have come into the possession of the department. To the information contained in the following letter from the pen of Dr. James Law, which appeared in the New York Tribune of February 25, is due in part the active measures instituted by the authorities of that State for the suppression of this destructive malady:

A REVIEW OF THE DISEASE.

TO THE EDITOR OF THE TRIBUNE:

SIR: The excitement about the cattle disease has had its proverbial course of nine days, and there are already signs of reaction. From every side we begin to hear statements that the danger has been exaggerated, that the disease only exists in three or four herds, that it is seen only sporadically—not epidemically; that the English live-stock trade must be speedily re-established; and that, in short, the whole thing has been a gigantic mistake. Should this spirit prevail so as to prevent a uniform and concerted action by the different infected States to crush out this baneful exotic, it will rob the country of her best, and perhaps her only chance, of securing and maintaining the European live-stock market.

If the object of this *laissez faire* argument is to soothe the minds of our European cousins, and persuade them that this disease is less dangerous than that of Europe, they may as well save their labor. Europe has learned by centuries of sad experience the true nature of the contagious pleuro-pneumonia of cattle. Europeans now realize that wherever there is one animal suffering from this disease, there is a standing menace to the whole cattle of the country. They know that where they allow the disease to exist at all it decimates their herds yearly. They know that wherever they have boldly grappled with the enemy, crushed out every remnant of the malady and its virus, and jealously guarded their frontiers against its further importation, they have permanently cleared their folds of a disastrous pestilence. They see that wherever the disease has appeared in Western Europe, or in the western or southern hemispheres, it has only been where a diseased animal or its virulent products have carried the seeds into such a land. They know that so long as they allow the free importation of cattle from an infected country, all their efforts to crush it out of their home stock will be absolutely futile.

Turning to England, which has been the main agent in drawing public attention to the matter, she was absolutely ignorant of this disease until forty years ago, and in Yonatt's and other veterinary works published prior to this date we find the most unsatisfactory accounts of this and other plagues known only on the continent. But from 1839, when it was first, in the present century, brought to the British Isles, and above all since 1842, which brought the free-trade act and the free importation of continental stock, Great Britain has suffered more from this than from all other animal plagues put together. It was estimated that in the first quarter of a century after its introduction this plague cost England \$450,000,000 in deaths alone. The additional losses from deterioration and lack of live stock, and from the infection of forage, &c., which

For these acts and the rules alluded to in this paragraph, see appendix.

could no longer be put to their most profitable uses, have never been computed, but must enormously swell the sum total.

England had a hard lesson to learn, and she has been forty years in learning it, but we may depend upon it she has now learned it most thoroughly, and can no more forget it nor treat it with indifference while the present generation survives. Many years ago I was engaged, with other veterinarians who had acquainted themselves with the continental experience and literature, in enforcing on Great Britain the truth that to deal with this disease economically they must kill out the poison within their own borders, and exclude all stock from infected countries. Then, as now, we found many alleging that the disease was native to the soil, and occurred sporadically, not epidemically. Then, as now, we found men bearing the name of veterinarians, who had fallen so far behind the age as to support these allegations, being either criminally ignorant, or so morally oblique that they preferred the wrong because the popular side. So long as it can be shown that this disease never invades a new country, but as imported in the animal body or in some of its products, so long will all claims for its spontaneous generation, its sporadic appearance, or its development from certain local conditions, like swill-feeding, be put out of court.

THE DISEASE PROPAGATED BY CONTAGION.

The history of the malady in all time, and in all countries and hemispheres, east, west, north, and south, testifies with one voice that out of the steppes of Eastern Europe and Asia it is propagated by contagion alone. The unreasoning and misleading talk about "no epidemic" is, therefore, in the highest degree reprehensible. The affection is not an epidemic in the sense of being due to some generally diffused influence, which acts alike upon all the stock of the country, and strikes them down indiscriminately, and without regard to proximity or contact. Were this the case, our efforts to permanently extirpate it were vain. But its spread is always and only proportionate to the facilities for contagion and infection. And the present comparative immunity of America is only due to the fact that the plague reached here at that seaport toward which the greater part of the cattle traffic of the country tends, and from which few animals are removed inland. Given in the United States the same free movement of cattle from our infected points to all points inland as was till recently seen in Great Britain, and there would speedily follow the same general infection of the country. This is sufficiently illustrated in our past American experience. Massachusetts imported the disease from Europe, and although it was met by repressive measures as soon as recognized, it cost the commonwealth two years and \$70,000 to extirpate it. It was imported into Brooklyn, and though it had to fight its way against the uniform current of cattle traffic eastward and northward, it has extended to New Jersey, Pennsylvania, Maryland, Virginia, and the District of Columbia.

My recent observations in this neighborhood are in perfect harmony with the above. The stables at Blissville, holding 800 to 900 cattle, fattening and milking, the property of different owners, who could purchase when they chose in the surrounding infected locality, could not fail to become a prominent hot-bed of the disease. Had such stables, with all their drawbacks of overcrowding, filth, and swill-feed, been thoroughly disinfected, filled with healthy Western stock and sedulously secluded from all neighboring cattle and visitors, they would not have become infected with contagious pleuro-pneumonia. Again, at Fifteenth street, Brooklyn, I found that all, or nearly all, the dairies in the vicinity had recently suffered from the disease, and that this infected center was within two blocks of Prospect Park, where the herd of Jerseys had been subjected to its ravages in August and September. At New Lots, Kings County, where I found seven infected herds in a very limited area, the testimony of the owners was to the effect that the disease only appeared and spread through their herds as they bought new cows from jobbers. At Roslyn, Queens County, I found two infected herds; the first contaminated by two cows bought from a New York jobber, and the second by two cows bought from the first. In New York City I found one infected herd, caused by a cow purchased from the same jobber whose cows took the disease to Roslyn. The Connecticut herd which I examined at Morrisania was infected by two cows purchased from a New York jobber, and the same man, according to his own sworn testimony, was proceeding to resell members of the same infected herd into other dairies when his career was cut short by the action of the metropolitan board of health. Nor were the results in such cases but the infection of one or two in a herd; where the diseased cow was introduced a general infection was the usual consequence. All that I could learn about the progress of the disease in this and former years was to the same effect. The malady never appeared apart from the introduction of strange animals, and when introduced the general infection of the herd was the consequence.

RAPID SPREAD OF THE PLAGUE.

The disease is not widely prevalent, because it extends its ravages only by contagion and infection, and the conditions of the American cattle trade have been strongly op-

posed to this. But the disease has not only held its own for thirty-six years, but has slowly gained against every obstacle until it numbers its victims in six different States. It is not wanting in virulence, but will, when it has a fair opportunity, sweep with remorseless force over the entire land. To this it is daily tending. From Brooklyn it has laboriously crept onward as far as Maryland and Virginia, and unless extirpated it will continue its baleful course until, reaching our open pasturages of the West and South, it will poison the sources of our cattle trade, descend upon our Eastern States with every cattle-train, infect the rolling stock on all our great railroad trunks, and bid defiance to all control. Wherever it has met with similar conditions it has proved thus intractable. In the steppes of Eastern Europe it has held perennial sway despite the best directed efforts of the Russian Government, and on the open pastures of Australia it still prevails, notwithstanding the most persistent and almost ruinous efforts for its extermination. So will it prove should we neglect the present opportunity and allow it to spread until it reaches our unfenced ranges of Texas, Kansas, Colorado, Wyoming, &c.

We are advised to employ inoculation. But what is inoculation? If successful, the production of the disease artificially, with its prominent lesions, in a less vital organ. In every stable where cattle are successfully inoculated the poison is produced in unlimited quantity. It is diffused through the air. It lodges in the dry parts of the building, in the fodder, etc., and is preserved for months and years. Unless these buildings are subsequently disinfected, they are deadly to the first susceptible animal that enters them. Finally, the immunity obtained by inoculation is not permanent, but lasts at the most for about two years. Inoculation, therefore, is a ruinous recourse, unless a country is already generally infected. It is itself a prolific means of spreading the poison. It cannot be effectual, unless the whole bovine race of the country are operated on and all the calves as soon as dropped; and so long as it is practiced, the stables must be considered infected, and the stock coming from such infected centers must be held to be dangerous to the animals. No country in Europe has practiced inoculation to so great an extent as Holland, and no country in Europe is to-day more extensively ravaged by this disease. England has tried inoculation to a very large extent, and England has been reluctantly compelled to abandon it. Australia has fallen back upon it as a dernier resort, and she has found that it only lessens the losses, while it has failed to exterminate the disease.

THE INFECTION MUST BE STAMPED OUT.

The day may come when we, too, may wisely follow Australia in adopting a general inoculation as a palliative of the disease. But this can only be if we criminally neglect the plague until it reaches our Western stock-ranges and bids defiance to all efforts at its extinction. To follow such a course at the present time would be ruinous, indeed, and those who counsel it cannot understand the problem we have to deal with. As already remarked, England, engaged in extirpating the disease from her own herds, will never offer us an unrestricted trade in cattle so long as we harbor this insidious enemy. A maintenance of infection by continued inoculation of our herds assuredly means the indefinite suspension of our foreign live-cattle trade; and nothing will secure the resumption of this trade short of the entire extermination of the malady.

Certificates of soundness of the cattle shipped are not worth the paper they are written on. No one would knowingly export sick animals to Europe, and no one is capable of detecting the existence of this disease during its lengthened period of incubation. We need not shut our eyes to this fact, for assuredly the English, who have had a far longer and harder experience of the disease, will not. Those who, knowing the character of the malady, counsel any measures short of its speedy and absolute extinction, are the true enemies of the live-stock interests and of the country. If their words should prevail, the future generations of Americans, seeing their country more ravaged than even the States of Europe, and by plagues exotic to her soil, will look back with regret to the time when it had been possible for their fathers to have averted such a baleful legacy.

It is still possible for us as a nation to do what has been done by Norway, Sweden, Denmark, Holstein, Oldenburg, Switzerland, Massachusetts, and Connecticut, and what is now being attempted in England, to stamp out this plague, which as an exotic should never have gained a footing on our shores. If the governors and legislatures of the States now infected and if Congress do their duty, they will follow the lead of Governor Robinson, of New York, and spare no effort nor expense until this plague has been banished to the Old World, whence it came. And if every citizen will do his duty he will cause such power to be exerted on these State and national authorities as will forbid any further neglect of this matter. No one having a full acquaintance with the subject can afford to remain silent in face of the existing facts, and this feeling alone has impelled me to pen the above remarks. New York may act alone, but, if so, she must either establish a long quarantine at her border or she will soon again import the disease from New Jersey. New Jersey may act independently,

but she must be left in constant danger of infection from Pennsylvania and Maryland. So with the other States. The only path of safety is to wage a war of extermination simultaneously in all the infected States; and should the State legislatures and Congress fail to meet the need, they will prove recreant to their trust, and entail a great evil upon this continent.

Yours, &c.,

JAMES LAW.

ITHACA, N. Y., *February 21, 1879.*

In pursuance of the provisions of an act passed by the legislature of New York in the year 1878, entitled "An act in relation to infectious and contagious diseases of animals," on the 12th day of February last Governor Robinson appointed General Marsena R. Patrick his assistant, and directed him to take active measures for the suppression and extirpation of the disease in Kings and Queens Counties of that State. The following instructions were issued to General Patrick by the governor:

It has been made known to me that the infectious and contagious disease among neat cattle, called pleuro-pneumonia, has been brought into and exists in various places in the counties of Kings and Queens of this State. You are therefore directed, as such assistant, to prohibit the movement of cattle within said counties, except on license from yourself after skilled examination under your direction. You are also directed to compel all owners of cattle, their agents, employes, or servants, and all veterinary surgeons, to report forthwith to you all cases of disease by them suspected to be contagious. When such notification is received, you are directed to have the cases examined, and to cause all such animals as are found to be infected with the said disease destroyed and buried with slashed hides. You are directed, further, to quarantine all cattle which have been exposed to the infection of said disease, or are located in an infected place; but you may, in your discretion, permit such animals to be slaughtered on the premises and the carcasses to be disposed of as meat if, upon examination, they shall be found fit for such use. You will forbid and prevent all persons not employed in the care of the cattle there kept from entering any infected premises. You will likewise prevent all animals and fowls from entering such premises. You will prevent all persons so employed in the care of animals from going into stables, or yards, or premises where cattle are kept, other than those in which they are employed. You will cause the clothing of all persons engaged in the care, slaughter, or rendering of diseased or exposed cattle, or in any employment which brings them in contact with such diseased animals, to be disinfected before they leave the premises where such animals are. You will prevent the manure, forage, and litter upon infected premises from being removed therefrom; and you will cause such disposition to be made thereof as will, in your judgment, best prevent the spread of infection. You will cause all buildings, yards, and premises in which said disease exists, or has existed, to be thoroughly disinfected.

You are further directed, whenever the slaughter of diseased or infected animals is found necessary, to certify the value of the animal or animals so slaughtered at the time of slaughter, taking account of their condition and circumstances, and to deliver to their owner or owners, when requested, a duplicate of such certificate. Whenever any owner of such cattle, or his agent or servant, has willfully or knowingly withheld, or allowed to be withheld, notice of the existence of disease upon his premises or among his cattle, you will not make such certificate. You are further directed to take such measures as you deem necessary to disinfect all cars, or vehicles, or movable articles by which contagion is liable to be transmitted. You are also to take such measures as will secure a registry of cattle introduced into any premises in which disease has existed, and to keep such cattle under supervision for the period of three months after the removal of the last diseased animal and the subsequent disinfection of such premises. You are further authorized and empowered to incur such expenses in carrying out the provisions of the foregoing order as may, in your judgment, be necessary, and to see to it that the bills for such expenses be transmitted to this department only through yourself, after you have examined and approved them, in writing.

L: ROBINSON.

By the governor.

General Patrick at once established his headquarters at the Brooklyn board of health, and called to his assistance Professor Law and many other eminent veterinarians. Active measures were immediately instituted for a suppression of the disease, which will no doubt be continued with the same energy until it is extirpated.

Further legislation having been found necessary for the speedy and complete eradication of this malady, an additional act was promptly passed by the legislature of New York, on the 15th day of April. (For provisions of this act, see appendix.)

During the latter part of February last, and shortly after the commencement of this investigation of the condition of the dairy stock in the vicinity of Brooklyn, Dr. Law was summoned before the Senate Committee on Agriculture, which was then engaged in taking testimony in regard to the prevalence of pleuro-pneumonia among cattle in this country. At the request of this committee he submitted the following written statement:

PLEURO-PNEUMONIA IN NEW YORK AND ELSEWHERE.

STATEMENT OF DR. JAMES LAW.

INFECTION AND INFECTED PLACES AROUND NEW YORK.

Up to the time of my leaving New York we had found in that neighborhood thirteen centers of the contagious pleuro-pneumonia, embracing over twenty separate herds, and more than one thousand animals. At one place alone (Blissville), we are now killing the sick at the rate of twenty head and upward per day. We are further doing all we can to encourage the slaughter under our own supervision of the animals that are in such infected stables, but which do not yet show signs of illness. These are being disposed of at the rate of from thirty to seventy per diem.

Healthy animals slaughtered in this way are sold as human food and their hides disinfected. All infected places are placarded as such, and placed in quarantine, within which neither man, beast, nor bird is allowed to enter or pass out, save the necessary attendants, who are disinfected and forbidden to go near other cattle.

In the infected counties no movement of cattle is allowed save under special permit given after examination. All are compelled, under penalty, to report to General Patrick the existence of cases of contagious disease as well as all suspicious cases. Finally, all sick cattle killed to stay the progress of the malady are paid for by the State, according to appraisement, which shall in no case exceed one-half the original value of the animal. This point I consider all essential to encourage the owners of sick stock to report them, and at the same time to avoid the risk of artificial or careless infection of unmarketable animals for the purpose of selling them to the State.

The minor details of our action I need not record.

CATTLE KEPT AT THE BLISSVILLE SWILL-STABLES.

It having been testified before the committee that the cows in the stables of Gaff, Fleischmann & Co. were there for dairy purposes only, I think it requisite to correct the statement. The stables were filled not only with cows, but also steers and bulls. The stock belonged to many different parties, but mostly to dealers and butchers who hired their board. The owners of the stock had on their part, as a rule, no interest in the milk, which went to third parties as payment for the care-taking of the animals. The healthy cattle fattened rapidly and were sold for beef, and as there was a constant change of stock the contagion had an ample field among the newly-come and susceptible animals, and had a chance of extension to other places and herds with every beast removed, fat or otherwise.

I have had testimony that the fat stock frequently went out of Long Island, but have no personal knowledge of this. Now any such movement is prevented, and the consequent danger is at an end.

NATURE OF THE CONTAGIOUS PLEURO-PNEUMONIA.

When speaking of this disease we should strike out of our vocabulary such words as *epidemic* and *sporadic*. *Out of Eastern Europe or Asia the malady is absolutely unknown, save as propagated by contagion or infection.*

Wherever, out of these regions, it has made an inroad, it can always be traced to the importation of a sick or convalescent animal, or of some product of such an animal. Many such instances could be drawn from the records of its existence on the continent of Europe, but, manifestly, those cases are more satisfactory which refer to the extension of the disease to distant islands and continents. During the European wars at the beginning of the century, this malady, like the rinderpest, prevailed all over Europe, wherever the armies marched, and the eastern or steppe cattle were

drawn for their support. But the British Isles remained perfectly exempt until 1839, when the pleuro-pneumonia reached Ireland by some cattle sent by the British consul at the Hague.

It spread from this center, reached England some time in 1841, and since the passage of the free-trade act of 1842 has been kept up by continual arrivals of infected continental stock.

Yet it only reached where the railroads penetrated, and seemed to respect the Highlands of Scotland, where the native black cattle only are bred, and into which outside stock are never brought.

The *United States* knew no such contagious disease until the importation of an infected Dutch cow in Brooklyn, in 1843, and this, together with one or two other importations, have furnished the material for its extension over seven different States.

Australia, with her thousands of herds, was respected until 1858, when an English cow conveyed the poison which has since ravaged her herds without intermission.

The *Cape of Good Hope* remained clear until 1854, when an English cow carried the infection which still prevails in the cape herds.

The same truth is shown negatively by the fact that every country and State that has vigorously stamped out the first arrivals of disease, and taken measures to prevent further importation, has rid its territory of the pestilence. Among them may be named Norway, Sweden, Denmark, Schleswig, Oldenburg, Switzerland, Massachusetts, and Connecticut. Some of the countries have been again infected in connection with the Danish and Franco-German wars, which, for the time, destroyed all safeguards, but until such a contingency arrived their herds were preserved in health.

The fact that in our country and in Western Europe this disease is propagated only by contagion, is the grand central truth round which all our thoughts of the malady should revolve, and upon which we should base every measure adopted for its extinction. If the affection could arise spontaneously, from any faulty conditions of hygiene in our own land, then farewell to all hope of permanently ridding our herds of the plague. But all history testifies to the contrary, and we can foretell with as much confidence as we can the rising of to-morrow's sun, that if we could once extinguish the products of the imported poison, we need fear no more contagious pleuro-pneumonia until it is again imported from an infected land.

There is no such thing as a *sporadic* case of contagious pleuro-pneumonia, and no epidemic case in the sense that it is due to some condition of life apart from the presence of the virus in the country. Every case in this country, as in Western Europe, the Cape of Good Hope, and Australia, is the result of direct or indirect contagion, and of that alone.

It is true that affections of the chest will occur in all future time as they occur in other animals, and in man himself, and as they occurred in cattle before the importation of the contagious germ, but such cases have not been in the past and will not be in the future the cause of the propagation of the disease from animal to animal, or in other words of the development of a contagium.

Extirpate from the country this exotic contagium and we can supply unassailable beef to the world.

DANGER TO THE COUNTRY OF THE POSSIBLE INFECTION OF WESTERN HERDS.

For ten years I have been publicly warning the country of the danger of allowing this disease to extend to our Western States and Territories. (See especially *National Live Stock Journal*, March, 1878, and *Transactions of New York State Agricultural Society*, 1877-78.) Infection of the Western herds means speedy infection of all the cattle cars of the railways, yards, loading-banks, &c., and the starting of a constant stream of infected animals towards our Eastern States and markets.

This means a uniform infection of the country and losses of thousands of millions of dollars in a short space of time.

Worse than this, should the malady extend to our unfenced cattle-ranges it will be practically unmanageable. Such has been the experience on the open steppes of Russia and the cattle-ranges of Australia, where the most costly efforts at the extinction of the disease have proved futile and the poor palliation of inoculation has been established. (See *National Live Stock Journal*, March, 1878.)

DANGER OF INOCULATION.

The public advocacy of inoculation demands a word on this subject.

Successful inoculation in favorable conditions leads to the loss of but two or three per cent. of animals operated on. The survivors are protected from contagious pleuro-pneumonia for a variable period averaging two years. But every inoculated animal is infected, the places where inoculated animals are kept are infected, all their products are infected, and there must be the most thorough system of disinfection for all such places and things before immunity can be gained. Every new animal intro-

duced and every calf born must be inoculated. It becomes evident, therefore, that to the stock of the country at large inoculation produces all the dangers of an equal extension of the disease in the ordinary way.

Inoculation, therefore, is ruinous to any attempt at extinguishing the poison. It has been tried in Holland more extensively than in any country in Europe, and Holland is to-day the most plague-ravaged country on the continent. It has been followed extensively in Great Britain, but she has been reluctantly compelled to abandon it in favor of a system of absolute extinction. It has been practiced widely around New York, yet this district is probably now the most prolific center of the disease in America.

Australia has fallen back upon it as a *dernier resort*, after a fruitless attempt to expel the malady from the open pastures. We, too, must one day come to this wretched palliation, if we neglect to stamp out the disease while still confined to our eastern and inclosed farms, and allow it to reach our western open prairies.

DANGER OF MEDICINAL TREATMENT.

As with inoculation, so with the maintenance of sick animals alive for treatment. The production and diffusion of the poison is in exact ratio to the period during which the animal is allowed to survive after illness has been detected. To treat the sick, therefore, is almost equivalent to propagating the disease, because on a large scale and in all sorts of stables it is impossible to keep up a constant disinfection of the air and other diseased products.

Wherever extinction of the poison is attempted, treatment of the disease must be forbidden under heavy penalties.

IMPORTANCE OF UNITED STATES ACTION.

The isolated action by individual States is eminently unsatisfactory. In New York we are working at the extermination of the disease, but after we have accomplished this we can only preserve our immunity by subjecting all New Jersey cattle to a quarantine of one or two months at our frontier. If New Jersey on her part kills it out, she must quarantine against Pennsylvania, Pennsylvania against Maryland and Virginia, and so on as far as the disease is found to extend. Isolated action will be incomparably more expensive, tardy, and uncertain than a uniform movement under one central head, and everything ought to give way to secure such a desirable result. The question involves tens of millions of dollars of our foreign commerce annually¹ and the trade has been steadily increasing, so that it is surely a matter in which the central government can properly act.

SUGGESTION OF MEASURES FOR THE EXTINCTION OF THE DISEASE.

1st. Appoint a veterinary sanitary staff to act with the Commissioner of Agriculture in stamping out the contagion.

2d. Make it incumbent on all stock-owners and their representatives, and on all veterinarians, to report all suspicious cases to the Commissioner under a penalty.

3d. Let the sanitary staff promptly investigate all such cases and take measures accordingly.

4th. Let every infected county be proclaimed and placarded, and let all movements of cattle within such county be forbidden excepting by special license.

5th. Let all sick animals in an infected herd be at once slaughtered, their hides slashed, and the carcasses deeply buried; and in case the owner has not withheld notice of the existence of the disease let him obtain an order on the treasury for a suitable indemnity, which should in no case exceed one-half the value of the animals; failure to notify should entail loss of the indemnity.

6th. Let all cattle found in infected places be likewise slaughtered, their hides disinfected, and their beef allowed to pass into consumption as food, if fit for this purpose. For such animals, indemnity should be allowed to the extent of not more than two-thirds of the value, after deducting salvage obtained from meat and hides.

7th. Let all infected stables, all manure, and all movable objects that have come in contact with diseased cattle, be subjected to an exhaustive disinfection, and let all cattle afterward placed in such buildings be sequestered in quarantine under the supervision of the veterinary sanitary authorities until at least three months after the removal of the last sick animal and the disinfection of the premises.

8th. Let all railroad cars, ships, boats, wagons, and other movable objects that have become infected be cleansed and disinfected under the direction of the veterinary sanitary staff before they are again used for the transportation of cattle.

The advice to slaughter the exposed as well as the sick cattle I think very important, as it enables us to stamp out the disease quickly and to disinfect once for all, and

obviates the necessity for a long-continued and expensive supervision in the case of every infected herd. If such exposed animals are placed in quarantine, as we are still compelled to do by a defeat of the law in New York, we find that every three weeks or a month a new case develops, necessitating continued visitation, professional examination, and slaughter, and repeated and expensive disinfection, without taking into account the enormously enhanced danger of the extension of the disease to other herds.

One other question will not brook an hour's delay. The testimony concerning the two ship-loads of cattle slaughtered at Liverpool may be misleading, but unless a gigantic blunder has been committed it implies that the disease has already reached one or more isolated spots in the West. This was inevitable sooner or later if the disease was not crushed out in the East, and I have constantly uttered warnings on the subject. If it has already taken place it should be treated at once, for the evidence implies that not only has the malady gained a footing in the West, but that the owners of the infected stock are acting unfairly by the country, and selling off their infected stock to make what salvage they can. There are, then, not only of infected cars, stock-yards, &c., but of the sale of lean stock to different localities in the West, whence we shall have new streams of infection, until our unfenced ranges suffer. No delay should occur in ascertaining the facts of the case. If there has been a mistake it will relieve the country to know it, whereas if there is even one center of infection in the West it should be stamped out promptly at any cost.

REPORT ON THE STOCK-YARDS AT THE PORT OF NEW YORK.

In investigating the existence and status of lung fever in the cattle of Long Island and Manhattan Island, I met with several outbreaks in which the disease was traced to cows sold into the herds in question by Patrick McCabe, a New York jobber. Three such instances may be named: First, Mr. Wheelock, farmer, at Roslyn, Queens County, purchased two cows of McCabe in August, which communicated the disease to the whole herd of eighteen head, and to that of a farm about two miles distant, to which two of his (Wheelock's) cows were taken. Second, Mr. Brazzel, Eighty-first street, New York, got a cow from McCabe the week after Christmas which conveyed the disease to his herd. Third, Mrs. Stur, Fiftieth street, New York, had a cow from McCabe about ten days ago on trial. This cow had been sick ever since her arrival, and when I saw her on Saturday was in a condition of advanced pleuro-pneumonia. I had further information, from a man in the trade who has a high reputation for honor, that the cattle that had passed through the hands of this McCabe had been for two years the most prolific source of disease in the dairies of Brooklyn and Long Island.

Accordingly on Saturday last, in company with Dr. Lautard, I went to examine his (McCabe's) premises and stock, when we were much surprised to find that he kept them in the New York public stock-yards at Sixtieth street, and I could not discover that he had any other place. The clerk found in charge of the office at the yards assured us that he constantly kept his cows there, and only removed them as he found purchasers. He did not think he could have any other place for keeping cows.

At the time of our visit he had a number of cows in the yards. At these yards the cows of all the dealers are usually placed in the sheep-house for warmth, but this is immediately adjacent to the inclosures for the other stock, and all alike must enter and leave by the same roads and gates or wharves. Further, when the sheep-house is crowded the cows are turned out into the open cattle inclosures in the yard. Cows are received in these yards indiscriminately from near as well as remote places, including among the former Westchester, Rockland, and Orange Counties, which, according to the best evidence I can obtain, are infected. (I have not yet verified the last fact by personal observation.) No precaution is taken to prevent the proximity or contact of these cows with the other stock.

There seems, therefore, no alternative; we must consider the New York stock-yards at Sixtieth street as infected, and that stock shipped from these yards to Europe will be liable to develop the disease after landing if kept alive long enough to allow of the completion of the period of incubation. That the evil results have been seen mainly in the cows is explained by the fact that they are allowed time after leaving the yards for the completion of the period of incubation (one to two months), whereas the fat cattle even if sent to Europe are slaughtered before this time has elapsed.

JERSEY CITY STOCK-YARDS.

In these as in the New York stock-yards there is the entire absence of any means of separating cows brought from near and infected neighborhoods and stock brought from the West or other uninfected localities. The cow-stable is at the north side of the yards and can only be reached by cattle that have passed through among the inclosures for the other stock. The stable itself is furnished with open gates, not doors, facing the

inclosures for other stock and separated from them only by a narrow wagon road, perhaps fifteen feet wide.

Mr. Fowler, whom I found in charge of the yard, was violently denunciatory of the mere idea that this disease existed anywhere, and of all who would mention such a subject, and could with difficulty be persuaded to give any information regarding the yards, the stock, its proximity in the inclosures, and its disposal. He admitted, however, that they got four or five cows per week, and on rare occasions one or two car-loads; that they mostly came from Eastern Pennsylvania, and that they remained in the yards until they were sold to parties in New York City, Brooklyn, Jersey City, Staten Island, &c. I may here state that on the occasion of my visit, late on Saturday night, the cow-stable contained eighteen cows and eight calves waiting for sale; so that, according to Mr. Fowler, I must have hit upon the very exceptional case of an arrival of two car-loads.

I further drew from Mr. Fowler that the fat stock for exportation were taken from any part of the yards, wherever suitable animals could be found, and carried by boats to the ocean-going steamers. There was no attempt made to keep such animals apart from such as might possibly come from infected districts in New Jersey and adjacent States, nor from the inclosures where such cattle had formerly been, *as indeed why should there be, seeing the whole story of the disease was a fabrication?*

As bearing on the question of the probable infection of these yards, I shall add that the malady is well known to exist in Alexandria, Va. I have had the most circumstantial reports of its existence around Washington. According to Dr. Corlias, it prevails to some extent around Newark, N. J. Last year it made havoc in the town of Clinton, and the year before near Burlington, N. J. Further, in making inquiry among the farmers at New Lots, Kings County, New York, whose herds are now infected, I found that they had repeatedly traced the disease to Jersey cows brought into their herds. There is, therefore, the strongest circumstantial evidence that both the Jersey and New York stock-yards, the two points from which cattle are shipped to Europe, are infected places, and that the apparent absence of disease in American cattle when landed in England is due to the fact that they have not yet had time to pass through the long incubation period of the disease.

ABSURDITY OF A CERTIFICATE OF SOUNDNESS.

The professional examination at the yards of animals destined for exportation can never be better than a farce. The most accomplished veterinarian has no means of detecting the presence of the specific poison until the period of incubation has passed, and as this lasts for from three weeks to two months, the evidence of infection contracted in the New York stock-yards cannot possibly be recognized until long after the animals have landed in England. The great mass of our Western cattle is sound so far as the contagious pleuro-pneumonia is concerned, and if infected, it is presumably only after they have been sent East. The disease, therefore, can only be in the incubation stage so long as they remain on our shores, and in this stage no man can recognize it, though it only wants time for its development. Any examination in such a case must be the most empty of forms, and must be prejudicial rather than beneficial, inasmuch as it leads to the certifying of the soundness of animals that may be, and often probably are, infected. It is quite manifest that in the case of cattle that may have been infected in the New York or New Jersey stock yards, an examination a fortnight later on their landing in Liverpool would be almost as great a farce as the examination prior to shipment at New York. Hence the soundness of the English position in ordering the slaughter at the quays of all cattle from an infected country.

THE COURSE OF SAFETY.

If we can be assured that there is not yet an infected center in the great stock-raising regions of the West, the cattle from there might be safely shipped to England under the following regulations:

1st. Let the Western cattle-trains be made up of cars that have never been used for the local cattle traffic in the eastern parts of the Atlantic States or of such as have been thoroughly cleansed and disinfected before use.

2d. Let all such trains be from the West *through*, and let these take on board no live nor dead cattle, nor other unmanufactured products of cattle, east of given points on the respective lines, such points to be designated as soon as we know conclusively how far the pleuro-pneumonia has extended westward. Let such trains pass to designated stock-yards on the quays at least one-fourth of a mile apart from all other stock-yards, or cattle stables, or pastures.

3d. Let such yards be rigidly closed against all visitors, no one being admitted except the necessary attendants, and no one being employed as such who has recently been in charge of other cattle in the East.

4th. Should it be necessary to sell any such stock for home consumption, they must

be driven by their attendants to other yards or pastures at a distance, or to the other stock-yards, where buyers may see them. The attendants on the foreign stock-yards may drive such animals into the common stock-yards, but must not, on any account, enter themselves.

5th. The cattle intended for export must be transferred to the ocean-going ships direct, or carried to them on boats that have never been used for conveying other cattle, or that have been subjected to the most thorough disinfection subsequent to such use.

6th. It should be shown that the ocean-going vessels, in which the export cattle are shipped, have not carried, and do not now carry, any hides or other unmanufactured products of cattle; or, if they have previously carried such articles, that they have been thoroughly disinfected since.

PLEURO-PNEUMONIA—THE LUNG PLAGUE—CONTAGIOUS LUNG DISEASE OF CATTLE.

Pleuro-pneumonia is a malignant contagious fever to which, as far as known, cattle only are liable, and in them is accompanied by inflammation and other diseased conditions of the lungs and their membranes, together with great prostration of the entire system.

It proceeds from a poisoned condition of the blood. How, when, or where this poison was first generated it is impossible to tell. Nor is it less difficult to determine its specific nature. So far as reliable information has yet reached, it is never generated spontaneously, but depends entirely on the introduction of a virus or contagion into the system of a healthy animal. A single animal so infected infects the herd; the herd, subdivided and scattered, infects other herds until in time large areas of country have been visited and devastated by the fearful scourge.

Beginning, as we have reason to believe, in the far-off East, and at a remote date, its course has been westward until, crossing the Atlantic in the system of stock imported from European states, it has at length found lodgment here.

The earliest symptoms of the disease are not always easily detected, there being no intensity of inflammation at first, and the period of incubation varying often from eight or nine days to three or four months. The knowledge of the existence of the disease in adjoining States or farms, or even in remote sections from which cattle have been introduced, should serve to put every one on guard and lead to frequent thermometric trials even with cattle apparently in perfect health. While such trials would not, perhaps, in every case determine infallibly the existence or non-existence of the disease, yet in a very large majority of cases—possibly in nine out of ten, and particularly if other symptoms were present—they would lead to a right conclusion. The trial is made by inserting the thermometer in the rectum. If a rise of temperature to 103°–106° Fahrenheit is observed we may be reasonably sure that the disease exists, at least in an incipient state.

Its further development is indicated by fits of shivering, often so slight and transient as to escape the notice of all save the practiced eye; by a dull, staring coat, with (frequently) a rigid skin; by a harsh, dry cough, the more apparent when the animal is made to move briskly; by irregular chewing of the cud; constipated bowels; excrement dry; urine diminished, but with high color; and, in the case of cows, by a falling off in the quantity of milk.

At an early stage of pleuro-pneumonia there is a harsh sound or roar produced by the passage of air through the wind-pipe and its subdivisions, which may sometimes be heard at some distance from the sick animal. Occasionally the air rushing through the bronchial tube (made rigid by a mass of hardened lung) produces a very decided whistling noise. A somewhat watery discharge from the nose, increased in the

act of coughing, is noticed early in the disease, and driving sick cattle in the earliest stage produces much thirst, and there is sometimes aropy saliva discharged from the mouth, while the muzzle is hot and dry.

As the malady progresses the pulse rises to seventy, eighty, and even a hundred beats per minute; the respirations to thirty-five and forty per minute, and are labored and audible, while each expiration is accompanied in most cases by a short distinctive grunt or groan, the more marked whenever pressure is applied to the ribs over the lungs.

At this stage the cough increases, the gait becomes more languid, the eyes more prominent and fixed; the countenance assumes an uneasy, pained expression, and a disposition is manifested by the sick to separate from the well. When the animal stands the elbows are turned out, the fore limbs extended, the hind feet drawn forward under the body, the head and neck stretched out, and the back arched, while the nostrils are more or less convulsively expanded at each inspiration. When lying, to which there is a tendency, the animal rests, especially in the latter stages of the disease, on its brisket, or on the affected side, leaving the ribs on the healthy side as much freedom of motion as possible.

With a still further advance in the disease, the pulse becomes more frequent (often rising to 120 per minute) and the heart-beats, at first subdued, are now marked and palpitating; the tongue becomes foul and covered with fur, and the breath has a nauseous smell. Listlessness, grunting, grinding of the teeth, diminished secretions, and weakness rapidly increase; the breathing is more frequent and labored; the animal gasps for breath; the spasmodic action of the nostrils is more marked, the groan more audible; the temperature is irregular, the tendency being to coldness of the horns and extremities. These conditions are followed by a mattery or watery discharge from the eyes and nose, rapid loss of flesh, hide bound, and either obstinate constipation or else a violent watery diarrhoea of foetid matter associated often with a considerable discharge of clear-colored urine.

Percussion over the lungs will, in the beginning, often reveal the disease when not otherwise apparent. With some practice and a little care almost any one can distinguish the sick from healthy cattle by listening to the sides of the chest. In the earlier stages of the disease percussion gives out a clear or resonant sound, followed, as the malady increases, by a dull, heavy one, easily distinguished from the sound caused by the lungs in health.

Where one lung only is affected, partial, sometimes complete, restoration may result; but acute pleuro-pneumonia, in which both lungs are affected, we may safely assert is never terminated except by death.

As stated above, the period of incubation of this disease varies from eight or nine days to three or four months; the usual average period being from twenty-five to forty days. The acute stage of the disorder varies from seven to twenty-one days. Convalescence extends over a period of from one to three months, during the greater part of which time the convalescent animal is often capable of infecting healthy cattle.

As a rule, in mild outbreaks, the mortality attains twenty-five per cent., and in severe epidemics sixty, seventy, or even one hundred per cent.

In England, the lung disease has more than doubled the ordinary mortality of the country, entailing a loss of many millions of dollars.

While various remedies for this insidious disease have from time to time been recommended and tried, not one of them, nor all of them combined, have proved a specific against its destructive effects; and as a means to be relied on for the protection of the stock of the country, they

are worse than useless. As a rule, the malady baffles the skill of the most learned veterinary practitioners, frequently attaining its greatest mortality where most they have combated it.

Nevertheless, as there may be circumstances under which partial relief might be afforded by timely remedial agents, it is deemed expedient to give in this place the treatment which, in general, has been found most efficacious.

The course most obviously to be pursued, when the slightest symptom of the disease is observed, or where the slightest cause for suspicion exists, is to apply the thermometer, to separate at once every suspected animal from the rest, to use disinfectants, to adopt a low diet, and to watch carefully for further developments. The weight of testimony is against bleeding. If constipation is detected it should be removed by a moderate dose of salts. Slight diarrhoea need not be checked; but when violent use a mixture of gallic acid (or its equivalent) and gruel, one-half ounce of the former to one-half pint of the latter; or else, one-half ounce powdered alum to one quart of milk. Sometimes there is considerable swelling or bloating of the stomach, which may be removed by carbonate of ammonia—one ounce in a moderate quantity of gruel, repeated if necessary. To lower the temperature and ease the breathing give acid sulphite of soda, one ounce, twice a day. In an advanced stage of the disease administer one or two ounces of whiskey or of oil of turpentine every three or four hours. If no relief is observed employ copious warm-water injections, and give two or three times a day an ounce of carbonate of ammonia in a quart of linseed-tea. Although out of place in the acute stage of the disease, blisters, setons, rowels, and cauterization may be applied in some cases to advantage after the fever has abated. Several preparations of carbolic acid have been tried with more or less success. Perhaps the best is—

Pure carbolic acid,	1 drachm;
Water,	1 pint;

given at a dose, three times a day.

Convalescence begun, restoration to health will be hastened by giving a teaspoonful of sulphate of iron in the food at each meal. The herd itself from which the sick have been removed should be placed, as a possibly preventive measure, on daily doses of the same preparation, (sulphate of iron,) allowing about half a drachm to a drachm *per capita*, mixed with an equal amount of coriander seeds, given in meal or bran, the better to disguise the iron.

A post-mortem examination of the chest generally reveals layers of yellowish, friable, false membrane (covering-skin) stretching across and around the sack containing the heart. With them is found a yellowish, clotted fluid, highly charged with albumen and shreds of solid deposit. Diseased portions of one or both lungs are found adhering to the membrane of the ribs and diaphragm, from which there is more or less difficulty in detaching them. The membrane covering the lung, usually smooth and glistening, is rough and mottled with a number of more or less marked pimples or warts.

The fluid around one or both lungs varies from a few ounces to several gallons. At times it is tolerably clear when warm, and gelatinizes on cooling; at others it is difficult to separate it from the shreds of lymph and false membranes in which it is held. Pus-cells often abound in it, and it assumes in some cases the character of pus, from which an intolerable stench sometimes proceeds.

On removing the lungs the essential appearances of the disease in all

cases will be found quite uniform, although differing considerably in extent.

In recent and mild cases in which only one lung is affected, the surface of the lung may be smooth; parts of it collapsed, as in health, with the normal pink color preserved. The affected part is swollen, hard, and mottled. On cutting into this, the older diseased portions present a very peculiar marbled appearance. The substance of the lobules is solid and of a dark red color, and the tissue between the lobules is of a yellowish-red, more or less spotted with red points, but sometimes of almost pure yellowish-white color. The more recent deposits are distinguished mainly by a lighter red color of the thickened lobules.

At a more advanced stage of the disease the lung will be found harder and of darker color, its tissues having lost a portion of the marbled appearance, the blood-vessels obstructed, and showing how nourishment had been cut off from the lungs, while the older, darker, and more solid portion of the latter have become detached, so that they remain as foreign bodies imbedded in the cavities of the diseased tissue. The admission of air into these cavities, by dissolution of the lung tissue, produces the cavernous sounds which the ear can detect in the living animal.

On taking a warm diseased lung, severing the still healthy portions, making incisions into the parts solidified, and suspending them so that they may drain, a large amount of yellowish serum, of a translucent character, and varying greatly in weight, is obtained. The quantity of this serum, and of the solidified deposit in a diseased lung, is so large that, from a normal weight of four or five pounds, a lung attains ten, twenty, forty, or even fifty pounds.

The condition of the air-passages will be found to vary from one of perfect freedom in the healthy portions of the lungs to a state in which the mucous surface is coated with false membrane, or solid exudations of lymph in the diseased parts. These passages are sometimes found nearly filled, throughout their whole extent, with a deposit similar to that usually found on the surface of the diseased lung.

The heart's sack is sometimes found to be thickened by deposits around it, and not unfrequently to contain an excess of serum. The heart itself is contracted and pale, containing a little dark blood.

The organs of digestion at different stages manifest a state of dryness. The third stomach, which is so constantly packed with dry food in febrile diseases, is in the same condition in pleuro-pneumonia. In advanced cases there is found a more or less diffuse redness, and even effusion of blood in the large intestines, with fluid, fetid, and sometimes slightly blood-stained excrement, such as is discharged in life.

Such briefly, and in language free from technicalities, are the description, cause, symptoms, treatment, and post-mortem appearances of pleuro-pneumonia as gathered from previous publications of this Department and other recognized authorities.

APPENDIX.

MASSACHUSETTS.

LUNG FEVER OR PLEURO-PNEUMONIA OF CATTLE.

The following act, for the suppression and extirpation of the disease called pleuro-pneumonia among cattle, was passed by the Massachusetts legislature April 4, 1860:

AN ACT to provide for the extirpation of the disease called pleuro-pneumonia among cattle.

Be it enacted, &c., as follows:

SECTION 1. The governor is hereby authorized to appoint three commissioners, who shall visit without delay the several places in this commonwealth where the disease among cattle called pleuro-pneumonia may be known or suspected to exist, and shall have full power to cause all cattle belonging to the herds in which the disease has appeared, or may appear, or which have belonged to such herds since the disease may be known to have existed therein, to be forthwith killed and buried, and the premises where such cattle have been kept cleansed and purified; and to make such order in relation to the further use and occupation of such premises as may seem to them to be necessary to prevent the extension of the disease.

SEC. 2. The commissioners shall cause all cattle in the aforesaid herds not appearing to be affected by the disease to be appraised before being killed at what would have been their fair market value if the disease had not existed; and the value of the cattle thus appraised shall be allowed and paid out of the treasury of the commonwealth to the owner or owners thereof.

SEC. 3. Any person who shall knowingly disregard any lawful order or direction of said commissioners, or who shall sell or otherwise dispose of an animal which he knows, or has good reason to suspect, has been exposed to the aforesaid disease, shall forfeit a sum not exceeding five hundred dollars.

SEC. 4. The commissioners shall make a full report to the secretary of the board of agriculture of their proceedings and of the result of their observations and inquiries relative to the nature and character of the disease.

SEC. 5. The commissioners shall duly certify all allowances made under the second section of this act, and other expenses incurred by them, or under their direction, in the execution of their service, to the governor and council; and the governor is hereby authorized to draw his warrant therefor upon the treasury.

SEC. 6. This act shall take effect from its passage, and continue in force for the term of one year thereafter, and no longer.

[Approved April 4, 1860.]

On the 12th of June, 1860, the following additional acts were passed:

AN ACT concerning contagious disease among cattle.

SECTION 1. The selectmen of towns, and the mayor and aldermen of cities, in case of the existence in this commonwealth of the disease called pleuro-pneumonia, or any other contagious disease among cattle, shall cause the cattle in their respective towns and cities which are infected, or which have been exposed to infection, to be secured or collected in some suitable place or places within such city or town, and kept isolated; and, when taken from the possession of their owners, to be maintained, one-fifth of the expense thereof to be paid by the town or city wherein the animal is kept, and four-fifths at the expense of the commonwealth, such isolation to continue so long as the existence of such disease or other circumstances renders the same necessary.

SEC. 2. Said selectmen and mayor and aldermen, when any such animal is adjudged by veterinary surgeon, or physician by them selected, to be infected with the disease called pleuro-pneumonia, or any other contagious disease, may, in their discretion, order such diseased animal to be forthwith killed and buried at the expense of such town or city.

SEC. 3. Such selectmen and mayor and aldermen shall cause all cattle which they shall so order to be killed to be appraised by three competent and disinterested men, under oath, at the value thereof at the time of the appraisal, and the amount of the appraisal shall be paid as provided in the first section.

SEC. 4. Said selectmen and mayor and aldermen are hereby authorized to prohibit the departure of cattle from any inclosure or to exclude cattle therefrom.

SEC. 5. Said selectmen and mayor and aldermen may make regulations in writing to regulate or prohibit the passage from, to, or through their respective cities or towns, or from place to place within the same, of any neat cattle, and may arrest and detain, at the cost of the owners thereof, all cattle found passing in violation of such regulations, and may take all other necessary measures for the enforcement of such prohibition, and also for preventing the spread of any such disease among the cattle in their respective towns and cities and the immediate vicinity thereof.

SEC. 6. The regulations made by selectmen and mayor and aldermen in pursuance of the foregoing section shall be recorded upon the records of their towns and cities respectively, and shall be published in such towns and cities in such manner as may be provided in such regulations.

SEC. 7. Said selectmen and mayor and aldermen are authorized to cause all cattle infected with such disease, or which have been exposed thereto, to be forthwith branded upon the rump with the letter P, so as to distinguish the animal from other cattle; and no cattle so branded shall be sold or disposed of except with the knowledge and consent of such selectmen and mayor and aldermen. Any person, without such knowledge and consent, selling and disposing of an animal known to be effected with such disease, or known to have been exposed thereto within one year from such sale or disposal, shall be punished by fine not exceeding five hundred dollars, or by imprisonment not exceeding one year.

SEC. 8. Any person disobeying the orders of the selectmen or mayor and aldermen, made in conformity with the fourth section, or driving or transporting any neat cattle contrary to the regulations made, recorded, and published as aforesaid, shall be punished by fine not exceeding five hundred dollars, or by imprisonment not exceeding one year.

SEC. 9. Whoever knows, or has reason to suspect, the existence of any such disease among the cattle in his possession or under his care, shall forthwith give notice to the selectmen of the town or mayor and aldermen of the city where such cattle may be kept, and for failure so to do shall be punished by a fine not exceeding five hundred dollars, or by imprisonment not exceeding one year.

SEC. 10. Any town or city whose officers shall neglect or refuse to carry into effect the provisions of section one, two, three, four, five, six, and seven, shall forfeit a sum not exceeding five hundred dollars for each day's neglect.

SEC. 11. All appraisals made under the provisions of this act shall be in writing, and signed by the appraisers, and the same shall be certified to the governor and council, and to the treasurer of the several towns and cities wherein the cattle appraised belong, by the selectmen and mayors and aldermen respectively.

SEC. 12. The selectmen of the towns and mayor and aldermen of the cities are hereby authorized, when in their judgment it shall be necessary to carry into effect the purposes of this act, to take and hold possession, for a term not exceeding one year, within their respective towns and cities, of any lands, without buildings other than barns thereon, upon which it may be necessary to enclose and isolate any cattle, and they shall cause the damages sustained by the owners in consequence of such taking and holding to be appraised by the assessors of the town or city wherein the lands so taken are situated, and they shall further cause a description of such land, setting forth the boundaries thereof, and the area as nearly as may be estimated, together with said appraisal by the assessors, to be entered upon the records of the town or city. The amount of said appraisal shall be paid as provided in the first section, in such sums and at such times as the selectmen or mayor and aldermen respectively may order. If the owner of any land so taken shall be dissatisfied with the appraisal of said assessors, he may, by action of contract, recover of the town or city wherein the lands lie, a fair compensation for the damages sustained by him; but no cost shall be taxed unless the damages recovered in such action, exclusive of interest, exceed the appraisal of the assessors. And the commonwealth shall reimburse any town or city four-fifths of any sum recovered of such town or city in any such action.

AN ACT in addition to an act concerning contagious diseases among cattle.

SECTION 1. In addition to the commissioners appointed under the provisions of chapter one hundred and ninety-two of the acts of the year one thousand eight hundred and sixty, the governor, by and with the advice and consent of the council, is hereby authorized to appoint two additional persons to constitute, with those now in office, a board of commissioners upon the subject of pleuro-pneumonia, or any other contagious disease now existing among the cattle of the commonwealth.

SEC. 2. When said commissioners shall make and publish any regulations concerning the extirpation, cure, or treatment of cattle infected with, or which have been exposed to the disease of pleuro-pneumonia, or other contagious disease, such regulations shall supersede the regulations made by selectmen of towns and mayors and aldermen of cities, upon the same subject-matter, and the operation of the regulations made by such selectmen and mayors and aldermen shall be suspended during the time those made by the commissioners as aforesaid shall be in force. And said selectmen and

mayors and aldermen shall carry out and enforce all orders and directions of said commissioners, to them directed, as they shall from time to time issue.

SEC. 3. In addition to the power and authority conferred on the selectmen of towns and mayors and aldermen of cities, by the act to which this is in addition, and which are herein conferred upon said commissioners, the same commissioners shall have power to provide for the establishment of a hospital or quarantine in some suitable place or places, with proper accommodations of buildings, land, &c., wherein may be detained any cattle by them selected, so that said cattle so infected and exposed may be there treated by such scientific practitioners of the healing art as may be there appointed to treat the same. And for this purpose said commissioners may take any lands and buildings in the manner provided in the twelfth section of the act to which this is an addition.

SEC. 4. The governor, by and with the advice and consent of the council, is hereby authorized to appoint three competent persons to be a board of examiners to examine into the disease called pleuro-pneumonia, and who shall attend at the hospital at quarantine established by the commissioners mentioned in the foregoing section, and there treat and experiment upon such number of cattle, both sound and infected, as will enable them to study the symptoms and laws of the disease, and ascertain, so far as they can, the best mode of treating cattle in view of the prevention and cure of the disease, and who shall keep a full record of their proceedings, and make a report thereon to the governor and council, when their investigation shall have been concluded: *Provided*, That the expense of said board of examiners shall not exceed ten thousand dollars.

SEC. 5. The selectmen of the several towns, and the mayors and aldermen of the several cities, shall, within twenty-four hours after they shall have notice that any cattle in their respective towns and cities are infected with, or have been exposed to, any such disease, give notice in writing to said commissioners of the same.

SEC. 6. The commissioners are authorized to make all necessary regulations for the treatment, cure, and extirpation of said disease, and may direct the selectmen of towns and mayors and aldermen of cities to enforce and carry into effect all such regulations as may, from time to time, be made for that end; and any such officer refusing or neglecting to enforce and carry out any regulation of the commissioners, shall be punished by fine not exceeding five hundred dollars for every such offense.

SEC. 7. The commissioners may, when in their judgment the public good shall require it, cause to be killed and buried any cattle which are infected with, or which have been exposed to said disease, and said commissioners shall cause said cattle to be appraised in the same manner provided in the act to which this is an addition; and the appraised value of such cattle shall be paid, one-fifth by the towns in which said cattle are kept, and the remainder by the commonwealth.

SEC. 8. Whoever shall drive or transport any cattle from any portion of the commonwealth east of the Connecticut River to any part west of said river before the first day of April next without consent of the commissioners, shall be punished by fine not exceeding five hundred dollars, or by imprisonment in the county jail not exceeding one year.

SEC. 9. Whoever shall drive or transport any cattle from any portion of the commonwealth into any other State before the first day of April next, without the consent of the commissioners, shall be punished by fine not exceeding five hundred dollars, or by imprisonment in the county jail not exceeding one year.

SEC. 10. If any person fails to comply with any regulations made, or with any order given, by the commissioners, he shall be punished by fine not exceeding five hundred dollars, or by imprisonment not exceeding one year.

SEC. 11. Prosecutions under the two preceding sections may be prosecuted in any county in this commonwealth.

SEC. 12. All appraisals made under this act shall be in writing and signed by the appraisers and certified by the commissioners, and shall be by them transmitted to the governor and council, and to the treasurers of the several cities and towns wherein the cattle appraised were kept.

SEC. 13. The provisions of chapter one hundred and ninety-two of the acts of one thousand eight hundred and sixty [except so far as they authorize the appointment of commissioners] are hereby repealed, but this repeal shall not affect the validity of the proceedings heretofore lawfully had under the provisions of said chapter.

SEC. 14. The commissioners and examiners shall keep a full record of their doings, and make report of the same to the next legislature, on or before the 10th day of January next, unless sooner required by the governor; and the said record, or an abstract of the same, shall be printed in the annual volume of Transactions of the State Board of Agriculture.

SEC. 15. The governor, with the advice and consent of the council, shall have power to terminate the commission and board of examiners whenever, in his judgment, the public safety may permit.

STATE OF NEW YORK.

AN ACT to prevent the introduction and spread of the disease known as rinderpest, and for the protection of the flocks and herds of sheep and cattle in the State of New York from this and other infectious and contagious diseases. Passed April 20, 1886.

Be it enacted by the senate and assembly of New York:

SECTION 1. It shall be the duty of the health officer of the port of New York, in addition to the duties now imposed on him by existing law, to examine and inquire whether any animals are brought in any vessels arriving at said port in violation of any regulation of law passed by the Congress of the United States prohibiting the importation of such animals.

2. Whenever any animal is brought as a ship's cow, with no intention of landing the same or of violating any such law or regulation of Congress as aforesaid, the same shall be carefully examined and kept in quarantine for the space of at least twenty-one days, and if any symptoms of the infection or incubation of the disease commonly known as the rinderpest or any other infectious or contagious disease shall present themselves, it shall be the duty of the said health officer immediately to cause the said animal or animals to be slaughtered, and their remains boxed with a sufficient quantity of quicklime, sulphate of iron, or other disinfectant, and with sufficient weights placed in said box to prevent the same from floating, and to be cast into the waters of the said port. It shall also be his duty to cleanse and disinfect by suitable agencies the berth or section of the ship in which said animal or animals were lying or slaughtered, and also to cause the clothing and persons of all taking care of the same or engaged in slaughter and burial to be cleansed and disinfected.

3. William Kelley, of Dutchess County, Marsena R. Patrick, of Ontario County, and Lewis F. Allen, of Erie County, are hereby appointed as commissioners under this act, and with powers and duties as hereinafter enumerated.

4. In the event of any such disease as the rinderpest or infectious disease of cattle or sheep breaking out or being suspected to exist in any locality in this State, it shall be the duty of all persons owning or having any interest whatever in the said cattle, immediately to notify the said commissioners or any one of them of the existence of such disease; whereupon the said commissioners shall establish a sanitary cordon around such locality. And thereupon it shall be the duty of the said commissioners to appoint an assistant commissioner for such district with all powers conferred by this act on the said commissioners or their agents or appointees, which said assistant commissioner shall immediately proceed to the place or places where such disease is reported to exist, and cause the said animal or animals to be separated from all connection or proximity with or to all other animals of the ruminant order, and take such other precautionary measures as shall be deemed necessary; and if in his opinion the said disease shall be incurable or threaten to spread to other animals, to cause the same immediately to be slaughtered, their remains to be deeply buried, and all places in which the said animals have been confined or kept to be cleansed and disinfected by any of the agencies above mentioned; and also to cause the same to be carefully locked or barred so as to prevent all access to the same by any animals of a like kind for a period of at least one month. Any animal thus slaughtered shall be appraised under the supervision of said commissioners, and one-half of the value of said animal shall be paid by the State to the owner thereof.

5. It shall be the duty of the said assistant commissioner, immediately on his being notified of his appointment, or at any time thereafter of the breaking out of the said disease in any place contiguous to the same and within the county in which he resides, to give public notices of the same in at least one newspaper printed or published in the said county, and to cause notice to be posted up in at least five conspicuous places in said neighborhood, and it shall be his duty to enjoin, in said notice and otherwise, all persons concerned in the care or supervision of neat cattle or sheep not to come within one hundred feet of the said locality without the special permission of the said assistant commissioner.

6. It shall be the duty of the commissioners appointed under this act, whenever they are advised that any such disease has made its appearance within the limits of the State, to publish in the State paper and in at least one paper published in any county where such disease exists, a statement of the methods approved by the New York Agricultural Society for the treatment of cattle affected therewith, for the isolation of the same, for the disinfection of the premises or building in which said cattle are found affected as aforesaid, and for the prevention of the spread of the same through any agencies of whatever kind.

7. The commissioners aforesaid, and all such assistants as they may appoint, whenever in their judgment or discretion it shall appear in any case that the disease is not likely to yield to any remedial treatment, or whenever it shall seem that the cost or worth of any such remedial treatment shall be greater than the value of any animal or animals so affected, or whenever in any case such disease shall assume such form of malignity as shall threaten its spread to premises, either contagious or infectious or

otherwise, are hereby empowered to cause the said animals to be slaughtered forthwith and buried, as above provided, and to do all such things as are mentioned in the fourth section of this act.

8. The said commissioners or their assistants are hereby empowered to enter upon and take possession of all premises or parts thereof where cattle so affected as aforesaid are found, and to cause the said cattle to be confined in suitable inclosures or buildings for any time requisite in the judgment of the said commissioners or their assistants, and prior to the slaughter and burial of the said animals and the full and complete disinfecting and cleansing of such premises; and all persons, whether owners of or interested in such cattle or otherwise, who shall resist, impede, or hinder the said commissioners or their assistants in the execution of their duties under this act shall be deemed guilty, and on conviction of the same, of a misdemeanor, and shall be punishable with fine not exceeding one thousand dollars, or imprisonment not exceeding the term of six months, or of both, in the discretion of the court before which they shall be adjudged guilty as aforesaid.

9. The commissioners shall have power to establish all such quarantine or other regulations as they may deem necessary to prevent the spread of the disease, or its transit in railroad cars, by vessels, or by driving along the public highways; and it shall be proper for the governor of the State, by public proclamation as aforesaid, to enjoin all persons concerned or engaged in the traffic or transit of cattle or sheep, not to enter upon any such places, or take therefrom any such animal, or to pass through any such locality, and within such distances from the same as in the said proclamation may be prescribed.

10. The sum of one thousand dollars, or so much thereof as may be necessary, is hereby appropriated to pay to the said commissioners for their services, while actually engaged in the duties enjoined upon them in this act, at the rate of five dollars per day to each, and such further sums as may cause them actual expenditures in traveling to and from the places they may be called upon to inspect or visit, and in the printing or publishing of all regulations or notices mentioned in this act. And the further sum of fifteen thousand dollars, or so much thereof as may be necessary, is hereby appropriated out of any money in the treasury not otherwise appropriated, to pay for animals slaughtered by the provisions of this act, and the comptroller is hereby directed to pay for the same on the warrant of the said commissioners.

11. The assistant commissioners are to receive for each and every day while actually engaged in duties provided by this act the sum of three dollars per day, and all actual expenses and disbursements paid or incurred in the discharge of their duties as aforesaid, which said sums shall be a charge upon the county for which he is appointed, and shall, when duly audited by the board of supervisors of the said county, be paid by the county treasurer.

12. The slaughtering of animals for beef after having been exposed to the contagion, or supposed to have been so exposed, may be permitted by the commissioners, or prohibited by them, as they may judge proper.

13. This act shall take effect immediately, and shall continue in force for one year.

AN ACT in relation to infectious and contagious diseases of animals. Passed April 15, 1878; three-fifths being present.

The people of the State of New York, represented in the senate and assembly, do enact as follows:

SECTION 1. Whenever any infectious or contagious disease affecting domestic animals shall be brought into or shall break out in this State, it shall be the duty of the governor to take measures to suppress the same promptly, and to prevent the same from spreading.

§ 2. For such purpose the governor shall have power—

To issue his proclamation, stating that infectious or contagious disease exists in any county or counties of the State, and warning all persons to seclude all animals in their possession that are affected with such disease or have been exposed to the infection or contagion thereof, and ordering all persons to take such precautions against the spreading of such disease as the nature thereof may in his judgment render necessary or expedient.

To order that any premises, farm or farms where such disease exists or has existed be put in quarantine, so that no domestic animal be removed from or brought to the premises or places so quarantined, and to prescribe such regulations as he may judge necessary or expedient to prevent infection or contagion being communicated in any way from the places so quarantined.

To call upon all sheriffs and deputy sheriffs to carry out and enforce the provisions of such proclamations, orders, and regulations; and it shall be the duty of all sheriffs and deputy sheriffs to obey and observe all orders and instructions which they may receive from the governor in the premises.

To employ such and so many medical and veterinary practitioners and such other

persons as he may from time to time deem necessary to assist him in performing his duty as set forth in the first section of this act, and to fix their compensation.

To order all or any animals coming into the State to be detained at any place or places for the purpose of inspection and examination.

To prescribe regulations for the destruction of animals affected with infectious or contagious disease, and for the proper disposition of their hides and carcasses, and of all objects which might convey infection or contagion, provided that no animal shall be destroyed unless first examined by a medical or veterinary practitioner in the employ of the governor, as aforesaid.

To prescribe regulations for the disinfection of all premises, buildings, and railway cars, and of all objects from or by which infection or contagion may take place or be conveyed.

To alter and modify from time to time, as he may deem expedient, the terms of all such proclamations, orders, and regulations, and to cancel or withdraw the same at any time.

§ 3. Any person transgressing the terms of any proclamation, order or regulation issued or prescribed by the governor under authority of this act shall be guilty of a misdemeanor.

§ 4. All expenses incurred by the governor in carrying out the provisions of this act and in performing the duty hereby devolved upon him, shall be audited by the comptroller as extraordinary expenses of the executive department, and shall be paid out of any moneys in the treasury not otherwise appropriated.

THE IMPORTATION OF CATTLE PROHIBITED.

The following is an official copy of the act passed by Congress to prohibit the importation of cattle in 1865:

AN ACT to prevent the spread of foreign diseases among the cattle of the United States.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That the importation of cattle be, and hereby is, prohibited. And it shall be the duty of the Secretary of the Treasury to make such regulations as will give this law full and immediate effect, and to send copies of them to the proper officers in this country and to all officers or agents of the United States in foreign countries.

SECTION 2. *And be it further enacted,* That when the President shall give thirty days' notice by proclamation that no further danger is to be apprehended from the spread of foreign infectious or contagious diseases among cattle, this law shall be of no force, and cattle may be imported in the same way as before its passage.

Passed the House of Representatives December 11, 1865.

Attest:

EDWARD MCPHERSON, *Clerk.*

THE BRITISH GOVERNMENT.

The following is an abstract of the rules and regulations adopted by the British Government to prevent the spread of the rinderpest and pleuro-pneumonia among cattle, and foot and mouth disease among sheep in its Indian possessions:

1. When cattle or sheep are purchased at a fair, they should always be treated as having been probably exposed to contagion.

2. When cattle or sheep are being removed from one locality to another, they should not be allowed to mix with other cattle or sheep *en route*, and should never be kept overnight in or near quarters previously occupied, as such quarters are often contaminated by having recently been occupied by diseased animals.

3. When cattle or sheep are purchased in a fair or elsewhere, they should, on being brought to the purchaser's premises, be kept by themselves, and not allowed to mix with the old cattle of the farm, at pasture, or watering time, or any other time. They should be kept by themselves in complete isolation for one month or six weeks, in order to have proof afforded whether they are affected with a contagious disease or not.

4. When cattle are traveling, or are moved from one district to another, they are

liable to be exposed to contagion and contract disease; therefore, on their arrival at home, they should be carefully inspected, and if they have passed through an infected district, they should be kept by themselves for some time. (See Rules 20 and 21.)

5. When diseases of a contagious nature, or supposed to be of a contagious nature, appear among cattle, the first important duty is to separate the sick from the healthy animals.

6. Carefully inspect all the animals, and remove to the hospital any showing the slightest symptoms of disease.

7. Divide the healthy cattle into several lots, making each lot as small in number as space will permit. Picket the cattle in such lots a good distance apart and to windward of the sick cattle. Frequently inspect each lot, and remove at once any animal in the least unwell. By steadily adopting this plan, the disease will be found in a few days to exist only among one or two lots, and by at once removing to the hospital any becoming sick, the disease will speedily be arrested in spreading through the herd. Each lot should be kept isolated from other cattle for a period from four to six weeks.

8. The hospital to contain the diseased cattle should be inclosed by a strong fence and isolated. The attendants and the sick cattle must not be permitted to leave the isolated area. Food and water may be taken to the attendants and cattle, but no forage, water, litter, clothing, or anything else should be taken from the hospital. Dogs should not be allowed to go to and from the hospital, as they may carry contagium to places where healthy stock may be.

9. The dry litter, &c., of the hospital should be burnt inside the hospital area, and the moist dung and discharges, &c., should be frequently removed from the stalls and buried in pits dug in the hospital premises. These pits should be six feet or more deep, and should be filled with the wet litter, dung, &c., of the hospital up to within two feet of the surrounding ground surface, and then quicklime and good fresh earth should be used to fill up the remaining two feet.

10. The stalls, walls, &c., and ground of the hospital should be scrupulously cleaned by frequent sweepings and washings, and after every cleansing disinfectants, lime, ashes, or even dry earth, should be plentifully scattered over the floors and ground, and the wood-work and walls should be first washed and then whitewashed.

11. The hospital should be well ventilated; sulphur fumigation should be daily carried out for an hour or so in the hospital building, and at this time the doors and windows may be closed and the ventilators only kept partly open.

12. The constant burning of sufficient litter, opposite the doors or the windward side of the building, at seasons when flies are numerous and troublesome to cattle.

13. The sick cattle should be kept scrupulously clean, and have thin gruel and fresh green grass in its season for diet. The healthy cattle should also be kept on laxative food, as cattle fed on hard dry food have the disease in a more severe form than those fed on laxative fodder.

14. When these contagious diseases have prevailed among cattle or sheep, they should not be allowed to pasture, or to be kept with unaffected herds, until a month or six weeks have expired after the last case of disease occurring among the affected lot.

15. Animals that recover should be well washed with warm water and soap prior to being removed from the hospital, and, if obtainable, carbolic acid should be added to the warm water in the proportion of one wineglassful of the acid to a gallon of warm water.

16. Carcasses of stock that die of rinderpest, black-quarter, and other forms of anthrax fever, and pleuro-pneumonia, should be buried and covered with at least four feet of earth.

17. The hides of cattle that die of these contagious diseases should be either well scored or slashed with a knife, thus destroying their value, and should be then buried with the carcasses.

18. The surface of earth floors of stalls and ground on which cattle affected with contagious diseases have been kept should be removed and buried, and the earth below should be well dug up and turned over, and the floor remade with fresh earth. Brick and stone floors may be scraped, washed, and disinfected with quicklime or carbolic acid.

19. Poles of carts and harness, or saddlery, &c., used by animals affected with contagious diseases, should be washed and disinfected.

20. The periods of incubation of rinderpest, black-quarter, and other forms of anthrax fever all believed to be within twenty-eight days; so a month has been named as the time for an animal supposed to have been exposed to the contagium of these diseases to be kept isolated.

21. The period of incubation of pleuro-pneumonia varies from two to six weeks, but has been found, as a rule, to be about forty days; so, when cattle have been exposed to the contagium of this disease, they should be kept isolated for forty-five days.

A STRANGE CATTLE DISEASE.

Mr. W. W. Lenoir, of Shull's Mills, Watauga County, North Carolina, gives the following account of a strange disease which has prevailed among cattle in that State for several years past:

SIR: Your letter, directed to my former residence in Haywood county, North Carolina, reached me after long delay, but ought to have been answered sooner. I retained no copy of the letter written by me in 1872, to which you refer, in relation to the strange disease among cattle which has been of late years in the Northwest and North, incorrectly called the Texas fever, but which was known throughout a large portion of the South for many years before the independence and annexation of Texas by the vague name of the distemper, and is still so named.

It evidently prevailed first near the coast, and a dim outline of its history and progress, and of the imperfect knowledge and erroneous theories which prevailed concerning it, can be traced in this State, and probably in other Southern States, in the legislation concerning it.

In North Carolina we have a broad belt of land adjoining the coast, stretching entirely across the State from Virginia to South Carolina, which is almost a level plain, and which extends far enough inland to include many counties and parts of counties. This belt is composed of large bodies of exceedingly rich alluvial swamp-lands, which are rarely dry enough for cultivation without artificial drainage, and which lie along the streams, and are separated from each other by bodies of level, sandy, dry land which form the remainder of this level belt.

These swamp-lands are covered with dense forests of cypress, juniper, oak, and quite a variety of other kinds of trees, many of them of immense size. The dry sandy lands between the swamps are covered almost exclusively with forests of pine trees.

Above this level belt lies another broad belt, which also sweeps entirely across the State, and is called the sand hills. The alluvial lands along the streams extend through and above the sand hills, and have a similar forest growth, but are narrower, and form sometimes swamps and sometimes rich alluvial bottoms dry enough for cultivation in grain without ditching. The uplands of the sand-hill region are composed of innumerable hillocks, and low flat ridges, and narrow plains of very sandy land, the forest growth of which is almost exclusively pine.

Above the sand-hills and extending from them to the Piedmont region, another broad belt runs across the State, which may be called the midland belt of North Carolina. This is an undulating region, composed of clay upland, interspersed with fine alluvial bottoms along the streams. This belt is almost destitute of pine, except in the old fields, of which there are far too many—lands which have been once in cultivation, and have now grown up in thickets of what are called old-field pines. The principal native forest growth of this belt of the State is oak, with an abundant mixture, however, of hickory, poplar, walnut, dogwood, sourwood, gum, and a variety of other trees.

Above this midland belt of the State comes the Piedmont region, extending to the foot-hills and lower portions of the southeastern slopes of the Blue Ridge, and including the secondary ranges southeast of the Blue Ridge, called Lauratown, Brushy, and South Mountains, &c.; and the fine Piedmont valleys of the Dan, Yadkin, Catawba, Broad, and other rivers; which lie between the smaller mountain ranges and the Blue Ridge.

The Piedmont region is marked by a surface becoming by degrees more and more undulatory, broken, and at length mountainous; by the presence still of alluvial bottoms along the streams; by a greater variety of soil as well as surface of the uplands, portions of which are here found to be somewhat sandy; by a greater variety of forest trees, and by the partial reappearance of pines, which are now found scattered over the uplands among the other trees, not in excess, but in ample abundance.

Finally, we have the mountain region, including the summit of the Blue Ridge, which in North Carolina forms the water-shed between the Atlantic and Mississippi waters, and extending from it to the Alleghany range, which forms the State line between North Carolina and Tennessee. This highly elevated mountain belt has a cool, moist, temperate, healthful climate, and a delightfully varied surface of lovely valleys and rich mountain sides. Its agricultural resources are wonderfully varied and extensive. It is a land eminently suitable for permanent pastures and meadows; and when its immense forests are subdued and its lines of transportation opened up, it will soon become the finest grazing, stock-raising, and dairying land in the United States.

Please excuse this slight outline of the State, which is interesting in itself and has some bearing on the subject.

An early statute on the subject of the "distemper," enacted in North Carolina many years ago, prohibited the driving of cattle from the pine lands in the eastern portion

of the State to the oak lands in the middle portion of the State. This marked the progress the disease was making at that date, and indicated the belief that its cause existed in and was confined to the pine lands in the eastern portion of the State. But the disease has slowly crept across the midland belt and into and nearly across the Piedmont belt of this State. A recent North Carolina statute, passed I think in 1876-'77, prohibits the driving of cattle from below the Blue Ridge into Watauga county, which is on and west of the Blue Ridge, in the mountain region of the State.

I regret that I have not the means, in this secluded locality, of giving you exact dates and fuller references. I think that when I wrote the letter in 1872, to which you refer, the "distemper" had just reached Morganton, in Burke county, North Carolina, within a few miles of the foot-hills of the Blue Ridge. I am glad to be able to state that its progress, as it approaches the Blue Ridge and reaches higher elevation, seems to be slower; and strengthens the belief generally held here, that it will not get a permanent foothold in the cool climate of our mountains west of the Blue Ridge.

Some of the facts connected with the progress and contagious character of this disease are so strange as to challenge credulity; and yet so important and so easily verified, that it is still more strange that they are so little known, and have been subjected to so little careful and systematic investigation.

The progress of the disease over the region which it infests may be compared to that of the disease called ringworm on a surface of the human body. There is a slowly advancing angry external border around the infected region, in which border the disease is violently active, killing a large proportion of the cattle where it first makes its appearance, on many of the farms all, or nearly all. This angry border advances at an irregular rate, and presents an irregular outline, pausing in places for several years; and then perhaps advancing suddenly and destructively several miles in a single season. I think I have observed in Caldwell and Burke counties, North Carolina, and it is probably the case elsewhere, that it sometimes makes more rapid progress along the deep valleys than above them. I have not observed that it advances along the leading thoroughfares of travel and traffic, except as they conform with such valleys. In Wilkes county, North Carolina, it has made a long pause on the south bank of the Yadkin River. But I fear it is about to get a permanent foothold on the north bank. James Gwyn, Elkin, Surry county, North Carolina, who lives on the north bank of the Yadkin in Wilkes county, has lost cattle twice from it, and can inform you of its progress, in his neighborhood.

But though thus irregular in its outline and progress, this angry border which surrounds the infected region has, at all times, a tolerably definite location, and is designated among us as the "distemper" line. The region within, over which the disease has already passed, is said to be within or below the "distemper" line. The region beyond it to which the distemper has not permanently reached, is said to be above or without the "distemper" line.

The disease is most fatal in autumn, disappears after white frost, and does not reappear until warm weather in the late spring or summer.

The country below the distemper line, like the surface within the border of the ringworm, seems to be comparatively free from the disease. The cattle have become acclimated, and there are only occasional cases of the "distemper." But whenever cattle from above the distemper line are driven below it after warm weather is well advanced, or in winter, and suffered to remain there till then, there is a strong probability that they will take the "distemper" and die of it.

When cattle from below the distemper line are driven above it in winter, they may remain there permanently without any probability that they will suffer from or propagate the disease. And if cattle from below the "distemper" line, and acclimated there, are driven above the distemper line after warm weather has set in, they will thrive and fatten, and show no outward appearance of the disease. But they impart the disease in its most destructive character, especially when they have been heated by hard driving or work, to the healthy cattle around them. Cattle only passing over the road which they have traveled, it may be several days before, if it has not rained in the mean time, will take the disease and die. As cattle are very apt to smell the dung of other cattle in passing over it, it seems probable that in such cases the germs of the disease are inhaled from the dung.

Still more wonderful than this, when taken in connection with it, is the fact that the cattle thus taking the disease from apparently healthy cattle, and dying of it in its acute form, may die surrounded by healthy cattle of their own neighborhood to which they will not impart the disease. However violent such accidental outbreaks of the disease may be at the time, it never gains a permanent foothold when carried in this way far above the slowly advancing "distemper" line.

I am not skilled nor well-read in the diseases of cattle, or in other diseases. In the only book I have which treats of the diseases of cattle, a slipshod American rehash and abridgment of a standard English work, the disease called in England red water resembles our so-called "distemper" more than any other disease described in it.

The organized and widely extended inquiries of your department might determine some very interesting and important questions concerning this disease. Has it causes which give it a spontaneous origin in certain localities in the Southern States? Can those causes be removed? What are the best methods of preventing the spread of it beyond those localities, and of suppressing it where it has already a permanent foothold beyond them? What is the best treatment of the animals attacked by it, &c.

A widespread belief exists that it is caused by ticks. I am sure that this is an error. But it is worth investigating for the sake of exploding it. The ticks which often prey in disgusting numbers on the cattle at the South, both above and below the "distemper line," and may well aggravate the distemper, or any other disease, are worth investigating on their own account. Cattle may be kept free from them by the regular addition of brimstone to their food or salt.

Hoping that this very meager and imperfect statement may aid you in directing a more minute and accurate investigation of this disease, which has been so fatal to Southern cattle and has so depressed their value,

I am, very respectfully, yours,

W. W. LENOIR.

Hon. WM. G. LE DUC,

Commissioner of Agriculture.

RINDERPEST OR CATTLE PLAGUE.

The following letter, addressed to the Commissioner of Agriculture, gives the symptoms and *post mortem* appearances of the destructive disease known as rinderpest or cattle plague:

SIR: At your request I will give as fully as possible the symptoms and *post mortem* appearances of a fatal disease in cattle, known as rinderpest or cattle plague.

The disease I allude to made only one great invasion in Great Britain during the present century (in the years 1865 and 1866), and swept away many thousands of cattle, the money loss from its ravages being between ten and twelve million pounds sterling. At that time (1865 and 1866) I was in practice in a large agricultural district of England (Berkshire), and as soon as the disease visited that county I was appointed by the government one of the cattle-plague inspectors, and therefore had ample opportunities of examining large numbers of animals affected with the disease, and availed myself of the chance of making many *post mortems*.

The disease is purely contagious, and therefore preventable. It is a specific, malignant fever, indigenous to the Asiatic steppes of Russia, runs a definite course, and generally terminates fatally. It is essentially a disease of the bovine family, but may be communicated to the sheep, goat, deer, &c. It has a period of incubation varying from four to ten days; during this period the animal gives no indication of being affected.

Symptoms.—Primary fever, as indicated by a rise in the temperature; a remarkably dull and dispirited condition of the animal, which will stand with its head hanging down, ears drawn back, and coat staring, refusing all food or even water. Rumination is suspended; if made to move it shows great prostration of strength, and frequently staggers as if about to fall. The skin is hot in places, and remarkably so between the limbs; an eruption on, and a peculiar appearance and condition of, the mucous membrane of the mouth is seen; it is red and furred, presenting raw-looking spots, especially on the inner side of the upper lip and along the roof. The breath is fetid, and the mucous membrane of the vagina alters to a dark-red color. These signs are rarely absent. Tears early trickle from the eyes, which are red and expressive of suffering, and a watery discharge flows from the nostrils. There is a continuous increase of these secretions, which become more or less purulent in the advanced stage of the malady; rigors and twitching of the superficial muscles, failing pulse, oppressed breathing, sores on the skin, with discharges from the same. Emphysema of the tissues of the neck and back; the extremities are cold at the commencement of the disease, and in the latter stages the increased heat of the body gives place to a remarkable coldness along the course of the spine. Secretion of milk is arrested very suddenly, the animal grinds its teeth, arches the back, moans, and shows signs of great uneasiness.

At first the bowels are constipated, but soon violent purging commences, leading to dysentery, the evacuations being slimy, liquid, and sometimes of a dirty-yellow color, tinged with blood, of a fetid character, with much straining. The urine is scanty and dark in color. The buccal membrane becomes covered with a yellowish-white material, which can be easily stripped off, showing an ulcerated surface under it. The ani-

mal now stands with great difficulty, gets quite drowsy and unconscious; the breathing short, quick, and more painful.

The animal will sometimes sink as early as twelve hours from the commencement of the attack, but in many cases the disease will be protracted to the fifth or sixth, and occasionally to the eighth or ninth day. As death approaches the mucous membranes acquire a leaden hue, with dark-colored spots on their surface. Tympanitis sets in, and the discharges from the bowels are involuntary.

The mortality in Great Britain was very great. The disease is highly contagious, and will not yield to medical treatment. Vaccination and inoculation were tried, but all seemed only to spread the pestilence.

Post mortem appearances will differ according to the part of the organism chiefly affected, and especially according to the time of duration of the malady. In many cases, the roof of the mouth will be found covered with a dirty-yellow exudation upon an ulcerated surface, the lining of the larynx, pharynx, and all the mucous membranes of the mouth is of a deep red color, and often covered with a layer partaking of the characters of lymph and pus combined, varying from the finest film to a quarter of an inch in substance. The lungs are often covered with a soft membranous exudation; emphysema of them is also very commonly found, but not always. On opening the abdominal cavity, the omentum is frequently found to present patches of redness; the intestines are altered in color, from the condition of the mucous membrane being partially seen through their walls. On cutting the rumen (or paunch) a quantity of undigested food is generally found, but nothing more than a tinge of redness in patches can be found here. The reticulum (honey-comb) does not show any signs of the disease; the omasum (manifolds) affords, in the majority of cases, very characteristic indications of the effects of the malady, its folds being inflamed in patches, or ulcerated in patches, even showing large perforations from sloughing, with claret-colored edges. The contents of this stomach are dry and caked.

The fourth, or true digestive stomach, the abomasum (rennet) is inflamed and shows specific lesions of the disease. The contents are nearly always fluid, and often mixed with blood; the mucous membrane is not only intensely red, but is studded with superficial erosions; the membrane can be easily removed from the submucous tissues, in some cases showing deep sloughs or ulcers. This condition is more marked near the pyloric region, being of a claret color.

The intestines show similar morbid changes, particularly the jejunum and the ileum, also the cæcum, which shows a peculiar mottled appearance from the accumulations, in the follicles, of a dirty-white or yellowish secretion. The liver is mostly unaffected, but the gall-bladder is remarkably full. The lining membrane of the vagina is of a dark red color and semi-detached condition.

I have given above all the early symptoms of this disease, together with the *post mortem* appearances, and I am sure you will agree with me that it differs materially from any other disease of the cow or sheep.

Sheep will take the disease from cattle; in order to test this, experiments were tried at the Royal Veterinary College, London. Sheep took the disease from cattle and died, showing the same *post-mortem* appearances. Cattle also took it from the sheep and died. Afterward Professor Simonds found a large number of sheep in England affected, from having been in company with or near diseased cattle.

Professor Law, of Cornell University, says: "Treatment of this plague should be legally prohibited under all circumstances, all the attempts of the different schools of medicine, and of empiricism have only increased its ravages; while nations and districts that have vigorously stamped it out, and excluded it, have saved their property."

I trust we have no cases of this terrible scourge in this country, and that the reports in some of the Philadelphia newspapers of the past week, of its prevalence in the vicinity of Washington, may prove to be unfounded, as I have cause to believe they are. But if ever introduced into this country, the victims and all other cattle with which they had been in contact, should be promptly destroyed and buried deeply, and the places and things with which they have come in contact be disinfected in the most perfect manner.

I have the honor to be, sir, your most obedient servant,

JOHN W. GADSDEN,
M. R. C. V. S., England.

PHILADELPHIA, October 26, 1878.

GLANDERS.

EXPLANATION OF ILLUSTRATIONS.

[These illustrations are photographic copies of the plates accompanying Professor Gerlach's treatise on glanders, published in the *Jahresbericht der Koeniglichen Thier-arzneischule zu Hannover*, 1868. The same illustrate the morbid anatomy of glanders.]

PLATE I.—FIG. I. Development of glanders-cells of connective-tissue corpuscles in the mucous membrane of the septum. Enlargement 300.

1. Spindle-shaped cells, with a large oval nucleus.
2. The same, more swelled; nucleus larger; a second nucleus developing.
3. Cells like No. 2, but with ends blunted; more granulated and approaching decay.
4. Round cells of different size, with a large nucleus; the largest ones have a dark, granulated nucleus; beneath free nuclei and granulated detritus.

FIG. II. Microscopic cut from gray-yellowish glanders; nodules of the mucous membrane of the septum, in which (cut) can be seen spindle-shaped cells in different stages of development to round cells with a fibrous intercellular substance. Enlargement 300. At *a* the spindle-shaped cells and at *b* the round cells prevailing.

FIG. III. Development of glanders-cells of epithelium elements in the pulmonal nodules. Enlargement 300.

1. Normal cylinder-cell with a nucleus.
2. Cylinder-cell with a second nucleus developing.
3. Cylinder-cell with two and three developed nuclei.
4. Bag-shaped rudiments of cylinder-cells filled with young round cells.
5. Giant-cells with young round cells.
6. Small and large round cells with a large, dark, and granulated nucleus.

PLATE II.—FIG. IV. Lower end of the septum with glanders-nodules and ulcers. (Natural size.)

1. Various gray glanders-nodules.
2. A group of glanders-nodules with a round hole in the middle. (Incipient glanders-ulcers.)
3. A solitary glanders-ulcer.
4. Confluent glanders-ulcers with elevated borders and dirty bottom.

FIG. V. Transversal cuts through the gray nodules in the mucous membrane of the septum. (Natural size.)

a. Gray nodule in the midst of the tissue of the mucous membrane; the upper layer of the mucous membrane raised.

b. Gray nodule in the upper layer of the mucous membrane, visible on the surface.

FIG. VI. A piece of the lower border of a lung, cut surface. (Natural size.)

1. Miliary tubercles.
2. Tubercle of the size of a pea.
3. A large glanders-nodule developing.

FIG. VII. Also a piece of the lower border of a lung, cut surface. (Natural size.)

1. Miliary nodules surrounded by a red crust.
2. Large gray glanders-nodule (glanders excrescence) growing yet in one direction.

GLANDERS.

Report Commissioner of Agriculture for 1878.

Plate I.

Fig I.

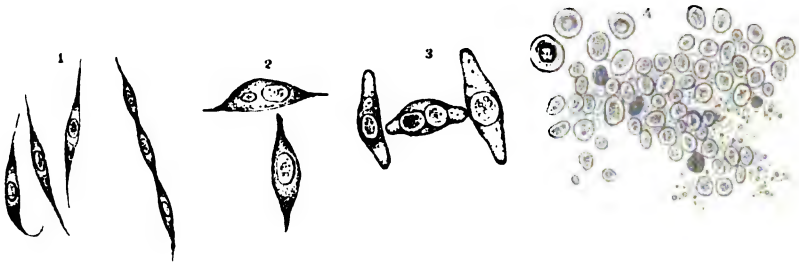


Fig I.

Development of glanders-cells of connective-tissue corpuscles in the mucous membrane of the septum.

Fig. II.

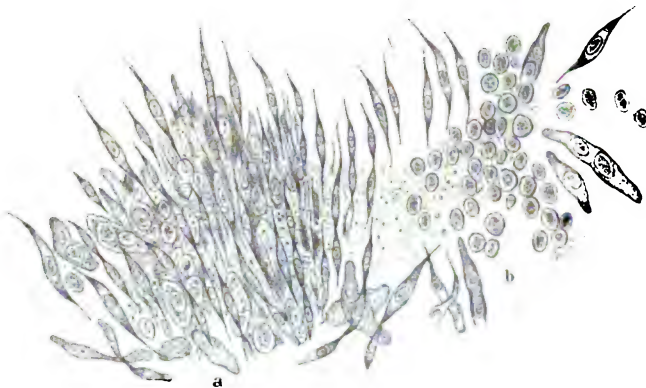


Fig. II.

Microscopic cut from gray-yellowish glanders.

Fig. III.

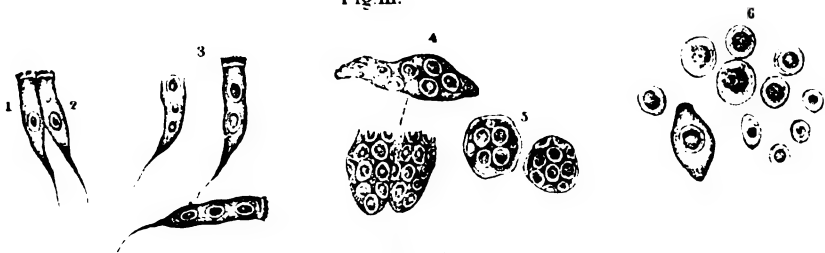


Fig. III.

Development of glanders-cells of epithelium elements in the pulmonal nodules



GLANDERS.

Report Commissioner of Agriculture for 1878.

Plate II.

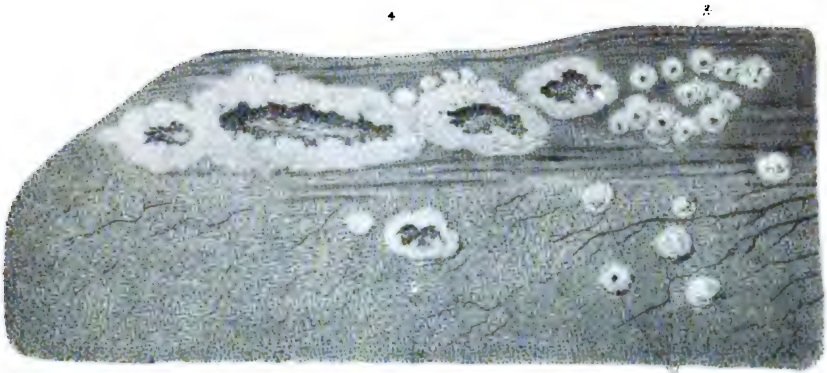


Fig. IV.

Lower end of the septum with glanders nodules and ulcers (natural size)



Fig. V.

Transversal cuts through the gray nodules in the mucous membrane of the septum (natural size).

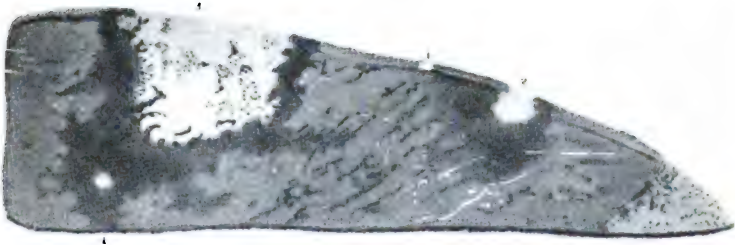


Fig. VI

Piece of the lower border of a lung cut surface (natural size)

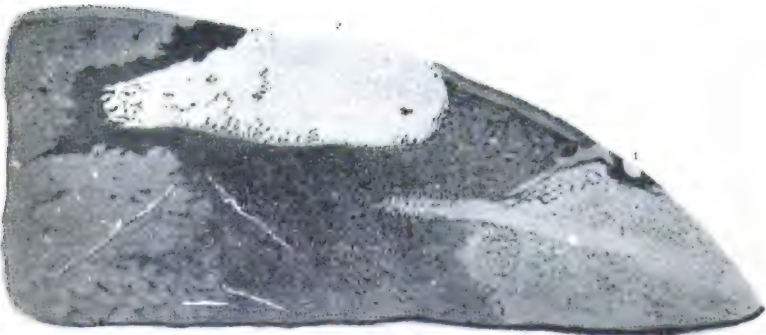


Fig. VII

Also a piece of the lower border of a lung cut surface (natural size).



GLANDERS.

By Dr. H. J. DETMERS, V. S., *Chicago, Ill.*

DEFINITION.—Glanders is a contagious disease *sui generis* of animals belonging to the genus *equus*. It has usually a chronic course, can be communicated by means of its contagion to several other species of animals and to human beings, and must be considered incurable if fully developed. The principal seat of the morbid process is usually in the mucous membrane of the nasal cavities. Three main symptoms, viz., discharges from the nose, swelling of the submaxillary lymphatic glands, and particularly ulcers of a peculiar, chancrous character in the mucous membrane of the septum of the nose, characterize glanders, and are, therefore, of the greatest diagnostic value. Wherever these three symptoms, or only two of them, are present and fully developed, there the diagnosis is secured. But unfortunately this is not always the case; sometimes two, and even all three, principal symptoms may be wanting, and still the horse may be affected with glanders. In such a case the seat of the morbid process is not in the nasal cavities, but further on in the respiratory passages, or even in the lungs. Several such cases have come to my observation, and have also been described by others, especially by Professor Gerlach. In still other cases, in which the disease might be called "external glanders," but is better known by the name of "*farcy*," the morbid process has its principal, or even its exclusive, seat in the subcutaneous connective tissue and in the skin or cutis. The late Professor Gerlach, in his treatise on Glanders, published in the "*Jahresbericht der Koenigeichen Thierarznuschnle zu Hannover*, 1868, discriminates, in consequence of these differences, three distinct forms: Nasal or common glanders, pulmonal glanders, and farcy. As such a division of glanders proper into nasal and pulmonal glanders—farcy is described by every author under a separate head—facilitates considerably the diagnosis, and explains also at once why just those symptoms which are usually looked upon as most characteristic remain sometimes imperfectly developed, or entirely unobserved, it will be convenient to adopt Gerlach's classification.

1. NASAL GLANDERS.—This form is that which is most common, best known, and characterized by the three principal symptoms which have been mentioned.

(a.) *The discharge from the nose*, although the most conspicuous of those three symptoms, is really the one which is the least characteristic, or of the least diagnostic value, because several other diseases of the respiratory organs are also attended with discharges from the nose, which are more or less similar. It is true, the discharge in glanders possesses some properties which, if considered as a total, are characteristic and are not found combined in any other disease; but the difficulty is one or another of these qualities is not always sufficiently developed. Consequently, if the other two principal symptoms, the swelling of the lymphatic glands and the ulcers in the nose, are absent or not observed, the discharges

from the nose are seldom characteristic enough to serve as the sole basis of a reliable diagnosis. The same are frequently one-sided, and, according to most authors, oftener from the left than from the right nostril. According to my experience they are nearly, if not quite, as often from the right as from the left nasal cavity, and, at any rate, just as often from both nostrils as from one only, but always more abundant from one, either right or left, than from the other. At the beginning the discharges are usually thin, almost watery, frequently greenish, or somewhat similar in color to grass juice; afterward the same appear to be composed of two different fluids, one yellowish and watery and the other whitish and mucus. Still later the discharges become thicker, more sticky, exhibit frequently a mixture of different colors, are sometimes greenish, sometimes dirty white or grayish, contain not seldom streaks of blood, and, in advanced stages especially, particles of bone or cartilage. They have a great tendency to adhere to the borders of the nostrils and to dry there to dirty yellow-brownish crusts. As to quantity, the nasal discharges in glanders are seldom very copious, at least not as copious as in many other diseases—strangles, for instance. The quantity, however, varies. Sometimes, especially when the weather is warm and dry, the discharges may be very insignificant or be absent altogether, and, at other times, particularly if the weather is rough, wet, and cold, will increase in quantity and become comparatively abundant. Several authors have attached special importance to one or another of the various properties as something characteristic, by which the nasal discharges in glanders can be distinguished from those of other diseases, but, in reality, none of those properties are constant enough, or belong exclusively to glanders, to be alone of great diagnostic value. Solleysel and Kersting considered the stickiness as such a characteristic, but the discharges in strangles are frequently just as sticky. Pinter and Vilét relied upon the specific gravity; they found that the nasal discharges of glanders, which consist partly of matter and partly of mucus, sink to a certain extent in water, while the mucus discharges of distemper swim on the surface. This test is of some value, but is not decisive, because matter is sometimes admixed also to the nasal discharges of other diseases. Others have laid stress upon the one-sidedness of the discharge, but the latter is just as often from both nostrils as only from one, and a one-sided discharge belongs also to some other diseases; is, for instance, observed in a catarrhal inflammation of one of the frontal or maxillary sinuses, if cavities in one of the three last molars of the upper jaw have effected a fistulous opening into the maxillary sinus, if a polypus has developed in one of the nasal cavities, &c. Professor Gerlach considers the greenish color as a very important characteristic, but that, too, is not reliable, because it is not constant, is usually observed only at the beginning, and belongs frequently, also, to the nasal discharges of catarrh, strangles, and influenza, if the patients are kept on green food or in a pasture. The nasal discharge constitutes a characteristic symptom of glanders only, if all its essential properties are present (sufficiently developed), and are considered as a whole. If the other principal symptoms (swelling of the lymphatic glands and ulcers in the nasal cavity) are absent or remain unobserved, some minor symptoms, which may happen to be present, and the absence of all such symptoms which are peculiar to other diseases, make frequently a diagnosis possible.

(b.) *A distinctly limited swelling of the submaxillary lymphatic glands* constitutes the second essential symptom, which is more characteristic of glanders, and of greater diagnostic value than the discharge from the nose. The swelling corresponds to the discharge; that is, if the latter

is one-sided, for instance, from the left nostril only, the glands of the corresponding left side of the head are affected, and if the discharge is from both nostrils the glands of both sides are swelled, but always those of that side the most on which the discharge is most copious. The swelling does not exhibit any conspicuous sign of inflammation, and is usually not painful, except at the beginning or after a sudden increase of the morbid process. It is always distinctly limited, and the swelled gland is always hard and usually of the shape and size of a peanut; may occasionally, however, be found as large as a hen's egg. Large inflammatory swellings without distinct limits do not belong to glanders. At first the swelled glands are more or less movable beneath the skin, but afterwards, in an advanced stage of the disease, the same frequently appear to be attached more or less firmly to the bone and are immovable. The swelling, unless irritated by external causes, never dissolves in suppuration like the inflammatory swellings common in distemper, and is absent only if the lymphatic glands have been extirpated, if the lymphatics have become obliterated, or if the morbid process in the mucous membrane of the respiratory passages is situated too high to be within the province of those lymphatics which are connected with the submaxillary glands, for the swelling is caused solely by a deposit of deleterious matter which has been absorbed by the lymphatics. Professor Gerlach looks upon every horse as probably affected with glanders which shows a distinctly limited, hard, knotty, and painless swelling of the submaxillary lymphatic glands. I will not contradict a man of his experience and learning, and admit that such a swelling constitutes a very suspicious and characteristic indication of glanders, especially if some other symptoms of that disease are also present; but I am obliged to remark that I have seen horses not affected with glanders in which those glands were swelled to the size of a peanut, and were hard, without pain, and movable.

(c.) *Ulcers of a peculiar, chancrous character* on the mucous membrane of the nose, and especially of the septum or cartilaginous partition between the nasal cavities, constitute by far the most characteristic symptom, and, in fact, the only one which makes the diagnosis a certainty, even if all other symptoms should be absent or imperfectly developed. Still, such is never the case; if there are ulcers in the nose, then there is also a discharge of matter mixed with mucus from the corresponding nostril. In some cases these ulcers are present, but are situated too high to be seen unless the horse is examined in bright sunlight and the rays of the sun are reflected by a mirror into the cavity of the nose. The seat of the ulcers is usually on the septum and near the nasal bone. Their size and shape vary (Fig. IV). Some ulcers are small, isolated, almost round; others are large, of an irregular shape, and of uneven depth. All produce matter, have elevated, corroded borders, a dirty, steatomatous-looking bottom, and are never covered with a scab. At first small gray specks or elevated gray spots (glanders-nodules), varying in size from that of a pin's head to that of a pea, make their appearance (Fig. IV, 1 and 2, and Fig. V, *a* and *b*). These nodules soon decay and form ulcers. Gradually the ulcers increase in size and depth (Fig. IV, 3); their borders become more elevated and corroded; the process of decay goes on; and if two or more small ulcers are close together, they become confluent, unite, and constitute one large, irregularly-shaped ulcer (Fig. IV, 4), which continues to increase in size and depth. Decay and destruction work their way deeper and deeper, even into the cartilage, and if ulcers happen to be existing in both cavities, or on both sides of the septum, it occurs not seldom that the latter becomes per-

forated. I observed several such cases, one especially in Lee Centre, Lee county, Illinois, in 1866, in which the hole in the lower or anterior part of the septum was fully as large as a silver half-dollar. The borders of the same appeared irregular, corroded, much swelled or elevated over the surface of the septum, and coated with a dirty-looking, discolored, and blood-streaked glanders-matter. The disease, in that case, was far advanced, and the animal about ready to die.

Sometimes it happens that a glanders-ulcer shows a tendency to heal; it loses its chancreous character; granulation makes its appearance; a scurf or scab is formed; a healing takes place, and a fibrous, whitish-colored, somewhat puckered or star-shaped scar is left behind.

Some authors have attached considerable diagnostic importance to a bluish or lead-gray color of the nasal mucous membrane, and to bluish or lead-gray spots, which usually make their appearance before it comes to ulceration. Such a bluish color, however, is not a constant symptom—in some cases only small red specks can be seen on an otherwise rather pale mucous membrane, and is not characteristic either, because it is observed also in catarrhal diseases, and in horses driven against the wind in cold weather.

(d.) *Minor symptoms.*—The three principal symptoms just described are usually accompanied by some others of minor diagnostic value, but under certain circumstances very important, especially if one or another of the principal symptoms should happen to be imperfectly developed. As such minor symptoms, may be mentioned, first, an accumulation of a glassy, whitish-gray mucus in the inner canthus or corner of the eye of the diseased side of the head. It is a symptom which usually makes its appearance at the beginning of the disease; second, a lusterless, dry, and dirty-looking, or so-called “dead” coat of hair; third, more or less difficulty in breathing; fourth, a peculiar short and dry cough, somewhat similar to the well-known cough of a horse affected with heaves. These last three symptoms, of which the cough is the most characteristic, make their appearance only after the morbid process has made considerable progress. In some cases the plain outbreak of the disease, or the appearance of plain and unmistakable symptoms, is preceded by a swelling of the inguinal, the axillary, and other lymphatic glands.

The difficulty of breathing, and the peculiar and somewhat characteristic cough, though only minor symptoms in common or nasal glanders, rise to great diagnostic importance if the morbid process has its principal seat in the lungs instead of the mucous membrane of the nasal cavities—if, in other words, the animal is affected with that form of the disease which Professor Gerlach has called “*pulmonal glanders.*”

It happens sometimes that a horse is affected with glanders and communicates the disease to other healthy animals, but does not itself show any of the three principal symptoms characteristic of that disease; has no discharge from the nose, no swelled glands, or ulcers in the nasal cavities. The late Professor Spinola, in his lectures on veterinary pathology at Berlin, related such a case to his students, which will serve as an illustration. It is substantially as follows: In a village near Berlin glanders broke out in a stable in which several horses were kept. A veterinary surgeon was called, who made an investigation and condemned every horse that showed any symptoms of the disease, and every animal condemned was immediately killed. The horses apparently not affected were kept for several weeks under police control, and from time to time inspected, but finally released. Among them was one old sorrel horse which had the heaves, and which had been brought

into the stable a short time before the first case of glanders made its appearance. This sorrel horse soon after was sold to a man in another village, and came into a stable containing also quite a number of horses. In that stable, too, glanders broke out. A veterinary surgeon (another one) was called, and every horse showing symptoms of glanders was condemned and immediately destroyed. The old sorrel horse, however, which was known to have "the heaves," was again released after some length of time, together with those which had remained exempted, and was sold once more, this time to a man who kept over 30 horses (I have forgotten the exact number) in his stable a few miles from the city. In this last stable glanders likewise made its appearance after some lapse of time, but in that case Professor Spinola was called. He, too, after a careful investigation, condemned every horse that showed any symptom of glanders, and insisted upon condemning also the old sorrel horse, whose history was then unknown to him, notwithstanding that no symptoms of disease, except such as are usual attendants of heaves, could be observed. The owner hesitated to consent to the loss of a horse apparently not affected with glanders, but Spinola insisted upon the condemnation. The *post mortem* examination revealed that the old horse, which had the "heaves," was affected with pulmonic glanders in a very high degree; and Spinola, after learning the history of the old sorrel, was convinced that the latter had caused the outbreak of the disease in all three stables. Professor Gerlach, in his valuable treatise, cites several cases, which to relate would lead too far. Some cases, though not so striking as that related above, have also come under my own observation. In pulmonic glanders the morbid process has its principal seat in the lungs, and may remain limited to the latter for months, and even for one or two years; and during that time, or as long as the morbid process is confined to the lungs, no prominent symptoms may make their appearance except such as are usual attendants upon heaves—some difficulty of breathing, and a peculiar short, weak, and dull cough, which must be heard, but is not easily described. Finally, however, but not before the disease has made considerable progress, the difficulty of breathing increases, more or less discharge from the nose makes its appearance, emaciation sets in, the natural glossiness of the coat of hair disappears and becomes rough, stands on end, and exhibits a so-called dead and dirty-looking appearance. The skin, too, loses some of its natural elasticity, and the animal becomes "hide-bound."

The morbid changes are revealed only at the *post mortem* examination. Smaller and larger glanders-nodules (usually called tubercles) present themselves in different stages of development and subsequent decay in the tissue of the lungs. Some of them constitute formations rich in glanders-cells (see illustrations), and others, especially if the disease is of long standing, as decayed, cheesy, dried, and shrunk substances and glanders-tumors of a sarcomatous and fibroid character. In some of the oldest ones even a deposit of lime-salts may have taken place. I remember one case, which occurred in Germany, a few miles from my residence, about twenty years ago, when I first commenced to practice. I was called to examine a horse suffering from some pulmonic disorder. The symptoms were those of pulmonic glanders in an advanced stage of development; even nasal discharges had made their appearance. I diagnosed glanders, but being young and without much experience, declined to take the responsibility of condemning the horse, because the laws of Germany are very strict in that respect, and provide that every horse affected with glanders be destroyed immediately. I therefore reported the case, not to the proper executive authorities, but to the

veterinary surgeon-general, who, at my solicitation, came immediately and examined the animal. He did not pronounce it a clear case of glanders, but doubted, at least hesitated. The owner, however, consented voluntarily to have the horse killed. The *post mortem* examination revealed pulmonal glanders in a very advanced stage. A similar case, of which I shall have to give a brief account in another chapter, I had an opportunity to observe in 1866, near Dixon, Lee county, Illinois.

As the principal symptoms of pulmonal glanders are essentially, for some length of time at least, only such as are also observed in common cases of heaves (one of the most frequent disorders of horses), the diagnosis must frequently be based, as a lawyer would say, upon circumstantial evidence.

A horse must be suspected of being affected with glanders, first, if the peculiar, weak, and dry cough constitutes, compared with the difficulty of breathing, the predominating symptom; if the animal becomes more and more emaciated and hide-bound, and if the appearance of the coat of hair is such as to indicate the presence of a cachectic disease. Second, if it is known that the animal in question has been exposed to the contagion. Third, if other horses have become affected with glanders or farcy, after having been together with the animal that shows those symptoms. Fourth, if a horse apparently affected with heaves has previously exhibited other symptoms, more or less characteristic or suspicious, of glanders. Fifth, if other symptoms, such as are observed in so-called "nasal gleet," or incipient nasal glanders, make their appearance.

3. FARCY, OR EXTERNAL GLANDERS.

The name "farcy" is given to such cases of glanders in which the morbid process has its seat in and immediately beneath the skin, and in which nodules, boils (glanders-buboes), and ulcers of a very infectious and chancrous character make their appearance in the subcutaneous tissue, and in the skin itself. Glanders-nodules and lenticular ulcers in the tissue of the skin, boils beneath the skin, smaller and larger open ulcers penetrating the same, a strand-shaped swelling of the subcutaneous lymphatics, swelled lymphatic glands, and oedemata, the latter especially in the legs and on the head, constitute the most essential symptoms.

Professor Gerlach discriminates two forms: Subcutaneous glanders or common farcy, and exanthematous glanders or skin farcy.

(a.) *Subcutaneous glanders or common farcy.*—The morbid process in this rather frequent disease has its principal seat in the subcutaneous connective tissue, and in the lymphatic system of the skin and between the skin and the muscles, but especially on the inner side of the hind legs, on the hips, on the neck, between the fore legs, and on all such places where the skin is thin and fine. At first distinctly limited swellings of an inflammatory character (incipient boils or glanders-buboes) make their appearance in the subcutaneous tissue. These swellings or boils soon commence to dissolve, or to decay, from within; the ulceration begins in the center, but the matter, being very corrosive, soon works its way into the skin, the boil finally opens, and presents a farcy-ulcer with a steatomatous bottom, and elevated, corroded, and inflamed borders. At the same time, or even before the formation of the first ulcer has become completed, deleterious matter is absorbed by the nearest lymphatics, and deposited in the lymphatic glands. The former, in consequence, swell to hard and plainly visible cords or strands, and the latter to painful and distinctly limited tumors. The partial or total

closing of the lymphatic vessels and glands thus effected interferes with, and even prevents, a performance of their functions, or stops the absorption of lymph, and oedematous swellings, more or less extensive, are the necessary consequence. The same make their appearance especially if the seat of the morbid process is on the inside of a leg, and if either the inguinal or axillary glands are swelled and closed by a deposit of deleterious matter. The more extensive and complete the swelling and closing of the lymphatic vessels and glands, or the more lymphatics are affected, the more extensive is also the oedema. Lameness, usually caused by such an oedema, is also a frequent attendant.

The roundish boils or tumors increase in size from that of a hazel-nut to that of a hen's egg. At first, when such a boil is making its appearance, it is not fastened to the skin; the latter can yet be moved a little in every direction over the boil, but soon the neoplastic process and the subsequent decay will extend to the tissue of the skin, and boil and skin will become firmly united before the ulcer breaks and discharges its extremely infectious and corrosive contents, consisting of decaying glanders-cells or matter, and lymph.

(b.) *Exanthematous glanders or skin farcy.*—In this form of glanders or farcy the principal seat of the morbid process is in the tissue and in the lymphatics of the skin or cutis. It is a rare form in horses, but the only one in which external glanders or farcy makes its appearance in a human being. Distinctly limited swellings (nodules and tumors) of the size of a pea to that of a hazel-nut, either isolated, or united and resembling a string of beads, make their appearance in the tissue of the skin. These swellings soon break, and then present round ulcers with elevated and corroded borders. The discharge consists of a mixture of matter, composed mainly of decayed glanders-cells and lymph. In other, though rather rare cases, the swellings are very small and numerous, and present themselves as small nodules, some of which are so small as to be scarcely visible, while others are about as large as common peas. These small swellings, too, are soon changed to ulcers, which are usually flat, lenticular, and constantly suppurating. If close together the same become frequently confluent. Only one case of skin-farcy has ever come under my observation. It was about five years ago, at Manhattan, Kans. Numerous small ulcers were crowded closely together on the nose and the muzzle of the horse, which was also affected with nasal glanders.

On the human skin, not being covered with hair, the whole process can be observed much better than on the skin of a horse. Professor Virchow's description of skin-farcy in men may, therefore, find a place. Virchow says:

At first these spots are much reddened, but very small, almost like flea-bites; then papular swellings are formed; the surface of those swellings rises gradually rather in the shape of a round and solid elevation than of a pustule, and assumes a yellowish color, which gives it a pustulous appearance. If the epidermis is removed from such a flat or roundish papule or nodule, which is not depressed in the center, but surrounded by a swelled and reddened court, a puriform, moderately consistent yellowish fluid is formed, which contains but few organized constituents, and consists mainly of the decayed elements of the formerly solid nodule. The fluid, therefore, is not lodged in a pustulous elevation of the epidermis, but in a small hole in the corium, which penetrates the latter as if it had been made with a punch. After some time the fluid (matter) becomes colored by hemorrhagic admixtures; still later its color is changed to bluish red, and finally small brown or blackish crusts or scabs are formed. Such eruptions appear sometimes in enormous numbers on the whole body.—(Gerlach's Treatise.)

Nasal gleet.—This is a name which I have accepted only with great reluctance, because it signifies no definite disease, and is used frequently,

as I shall hereafter have an opportunity to show, to cover ignorance, fraud, and crime. It can be retained only if applied exclusively to such cases of disease (usually occult or incipient glanders) in which the horse has a suspicious-looking discharge from the nose, but shows no other characteristic symptoms sufficiently developed to base upon them a sure diagnosis. So, for instance, it may happen that a horse has a chronic discharge of matter and mucus from one or both nostrils, and, perhaps, also a distinctly limited swelling of the submaxillary lymphatic glands, and yet neither the discharge nor the swelling may be sufficiently characteristic to justify the belief that the horse in question is affected with glanders, because the latter is a disease which, for obvious reasons, demands a correct and positive diagnosis. To declare that a horse has glanders is equal to condemning the same to be killed. The term "nasal gleet," therefore, is convenient and admissible, if used exclusively to signify a disorder of the respiratory organs attended with suspicious discharges from the nose, and other symptoms common in glanders, but not yet fully enough developed or sufficiently characteristic, one way or another, to make the existence or absence of glanders a certainty. Such a disorder, of course, must be considered as incipient or occult glanders till every doubt has been removed.

Chronic and acute glanders.—Glanders, as a rule, is a chronic disease. The morbid changes develop slowly. Of the various forms in which the disease is able to make its appearance pulmonic glanders, unless complicated with one of the other forms, or with other inflammatory or feverish diseases, is the most chronic, or takes the longest time to produce conspicuous symptoms and to become fatal. It takes frequently two or three years before the animal succumbs. Nasal glanders is usually not quite so slow in its progress; still it also very often takes half a year longer before the morbid process makes sufficient headway to produce plain, unmistakable symptoms, or before the chancreous ulcers, characteristic of glanders, make their appearance in the mucous membrane of the septum of the nose. Farcy, or external glanders, is usually the least chronic (comes the soonest to a termination) of the various (uncombined) forms of glanders. Plain and unmistakable symptoms (veritable farcy-ulcers) make their appearance almost always within three months and frequently within a week or two after the infection has taken place. In mules and asses, however, the various forms of glanders are usually less chronic, make a more rapid progress, are more destructive, and come sooner to a termination than in horses. The progress of the morbid process depends also to a great extent upon the constitution and the organization of the animal and the mode and manner in which it is kept. Weather and temperature, too, have considerable influence; warm and dry weather usually retards, and cold, wet, and stormy or inclement weather usually accelerates and spreads the morbid process. Most authors discriminate between acute and a chronic form of glanders. From a practical standpoint such a distinction is perfectly admissible, but to separate acute and chronic glanders as two different diseases, as has been done by some (French) authors, must lead, and has led, to very dangerous mistakes and to great confusion. Every form of glanders, as I have said before, is naturally—*es ipso*—more or less chronic in its course, but may become acute, either from the first beginning or at any stage of its development, and sometimes very suddenly, under any of the following conditions:

1. If a complication takes place either with one of the other forms of glanders or with another disease or disorder. Sometimes even a small

wound is sufficient to inaugurate the acute course or a rapid progress of the morbid process.

2. If glanders has been communicated by a direct introduction of glanders-matter into a wound, or a direct contact of the contagion with the blood. The greater the quantity of glanders-matter introduced the more concentrated the contagion inoculated, or the larger the wound the more acute or rapidly progressing and spreading is usually the morbid process of the communicated disease.

3. If the constitution of the animal has been weakened, or if the vitality of its organism has been seriously impaired either by glanders itself or by any other disease, although the course of glanders is naturally slow or chronic from the beginning, it is usually changed to an acute one as soon as the morbid changes have become sufficiently important and extensive to weaken essentially the constitution of the animal, and to cause a profuse infection or spreading of the contagion through the lymphatics in the animal organism. Toward its fatal termination glanders, therefore, always changes its course from chronic to acute. Unlike most other diseases it commences chronic and ends acute.

4. Exposure to wet, cold, and inclement weather, catching cold, hard work, close, dirty, and ill-ventilated stables, unhealthy food, &c.—in short, everything that is calculated to produce an injurious influence upon the organism, or is calculated to impair the health of the animal, has a tendency to accelerate the morbid process, to change the chronic course of glanders to an acute one, and to hasten the outbreak after an infection has taken place.

The morbid process of glanders is accelerated and caused to spread more rapidly if the latter becomes complicated with an inflammation, or with any very feverish or very typhoid disease. The morbid processes of glanders and inflammation increase each other reciprocally. The inflammatory process adopts, to a great extent, the nature and characteristics of glanders, and the morbid process of the latter disease becomes blended with the former, and assumes the attributes of an inflammation. In either case all the symptoms become very violent, and the morbid process progresses and spreads very rapidly, particularly in those tissues which are in a state of inflammation. Ulceration, too, becomes extensive in a short time, and the lymphatics, by absorbing the deleterious matter, seem to spread the contagion and the elements of glanders rapidly through the whole system. If the original disease is glanders, farcy will also make its appearance within a short time; and *vice versa*, existing farcy will soon be complicated with nasal and pulmonary glanders of an inflammatory character. The exudations produced by an inflammation which has assumed the nature of glanders are always very deleterious and corrosive and destroy like a caustic the tissues with which they come in contact. The morbid changes effected by such an inflammation resemble those of a malignant diphtheria. In extreme cases the morbid process may become so violent as to cause the neoplastic process, characteristic of glanders, to be superseded by immediate destruction and mortification. In such a case profuse, diphtheritic ulceration and destruction of tissue take the place of the neoplastic production of glanders-cells and their subsequent decay. The glanders-cells are destroyed (decay or perish) before their formation has been completed, consequently are absent.

That a direct and abundant introduction of glanders-matter into a wound, or a direct contact of the contagion with the blood, is well calculated to produce an acute form of glanders, or sufficient to inaugurate a rapid progress of the morbid process, is probably best illustrated by a

case which occurred about eleven years ago, near Dixon, Lee county, Illinois, where I was then practicing. A farmer, Mr. B., came to my office with a horse which he had recently bought, and which was apparently suffering from some pulmonal disorder. The animal was in a moderately good condition and free from fever. The morbid symptoms observed consisted in a slightly laborious breathing, a short, dull, but somewhat loose (not dry) cough, some discharge from one nostril, and a slight swelling of the submaxillary lymphatic glands of the same side of the head. The symptoms, consequently, were the same as are usually observed in pulmonal glanders; but as none of them were sufficiently developed or presented sufficiently characteristic properties to indicate with certainty the presence of glanders, and as no ulcers—the most important diagnostic symptoms of glanders—could be discovered in the nose, I hesitated to make a definite diagnosis, but informed the owner of my suspicion, and advised him to put the horse, if convenient, to hard work for the purpose of accelerating thereby the morbid process (if glanders), and to return the animal for further examination within a week or so. A few days afterwards the same farmer came again to my office with another horse with a badly torn eyelid and an inflamed eye for treatment. This latter horse, which I will call horse No. 2, had been bitten in the eyelid and had the same torn by the horse with the suspicious symptoms, which I had seen before, and which I will call horse No. 1. In examining the wound, which probably had been made during the night, I found the borders very much swelled, and the wound and the conjunctiva of the eye in a condition which strengthened my suspicions of horse No. 1 being affected with glanders. Still, by means of a few stitches, I united the margins of the wound as well as circumstances permitted. After I had performed the operation I examined the horse as to his general health, but especially as to symptoms of glanders. With the exception of some feverish acceleration of the pulse and the very inflamed condition of the torn eyelid and the conjunctiva, no morbid symptoms could be found. The horse appeared to be in good health and free from any respiratory disorder. The next day I saw both horses, Nos. 2 and 1, on B.'s farm, a few miles from Dixon. Horse No. 2 had high fever; the wound in the eyelid presented considerable swelling and had suppurated; some of the stitches had been torn out; and a lump of grayish and glassy mucus had accumulated in the inner corner or canthus of the eye. These symptoms, though comparatively insignificant under other circumstances, convinced me still more that the torn eyelid would not heal and that horse No. 1 was affected with glanders, and had communicated the contagion to horse No. 2. In the condition of horse No. 1 no essential changes had taken place, except perhaps a slight increase in the discharges from the nose. About a week later horse No. 2 presented plain and unmistakable symptoms of glanders, consisting of lameness, swelling of the inguinal glands, copious discharges from the nose, swelling of the submaxillary glands, and diphtheritic ulceration on the septum. The condition of horse No. 1 was almost unchanged. Both horses were killed the next day. The *post mortem* examination of horse No. 1 revealed, besides the characteristic morbid changes in the lungs, indicative of pulmonal glanders of long standing, only a few small ulcers high up on the septum, while horse No. 2 showed all the essential symptoms of fully-developed acute nasal glanders and of incipient farcy, but scarcely any morbid changes in the lungs. Whether the inoculation with glanders-contagion effected by the biting and tearing of the eyelid constituted the first communication of the contagion to horse No. 2 by horse No. 1, or whether a previous in-

fection had taken place (both horses had been worked together, and had been kept in the same stable a week or two before the eyelid was torn), I was unable to decide, but hold myself convinced that the direct introduction of a comparatively large quantity of the contagion into a fresh wound, and the immediate contact of the same with the blood, constituted the cause of the acute course of the disease, inaugurated by the inflammation in the wound of the eyelid. There can be no doubt of the disease having been communicated by horse No. 1 to horse No. 2, because subsequent inquiries elicited the fact that horse No. 1 had become infected with glanders several months before he came into the possession of Mr. B., by another horse to which the disease had been communicated by a condemned United States Army horse affected with glanders and sold by the government to a farmer, in whose possession he died.

Another case, perhaps not less illustrative, occurred in the same year, also not far from Dixon. I was called upon to examine a mule which showed suspicious symptoms, indicating the presence of glanders, but as no ulcers could be discovered in the nose a definite diagnosis could not be made. This, however, was the more necessary and desirable, as the mule in question had come from another State (Indiana), and had been bought only a few days before. To get out of the difficulty and to force a decision, I inoculated the mule with his own nasal discharges under the sternum behind the fore legs. In a few days a nice farcy-ulcer had developed, the symptoms of glanders proper, too, had made considerable progress, and the chronic course of the disease had been changed to an acute one.

Wherever glanders presents itself as an acute disease, either an uncommonly large quantity of the contagion has been introduced at once and brought in direct contact with the blood, or a complication of some sort has been effected.

The nature of glanders.—The hypothesis in regard to the nature of glanders, and the theories concerning the morbid changes and their relative importance, have differed very widely, and have recently undergone great changes. Although modern investigations have proved beyond a reasonable doubt that all the old hypotheses are erroneous, some of them soon get to have their adherents.

At the end of the last and the beginning of this present century most veterinarians looked upon glanders as a blood disease. Bourgelat (1779), Kersting (1784), and Coleman (1839), supposed that glanders proceeded from a morbid, corrupt, or defective composition of the blood and was the immediate cause of the disease.

Later veterinarians advanced different opinions. Dupuy (1849) called glanders an *affection tuberculeuse*, considered it, together with strangles or distemper, grease-heal, &c., as a tuberculous disease, and denied, like most French veterinarians, the existence of a contagion. Marel (1825) looked upon glanders as the natural consequence of a chronic inflammation of the nasal mucous membranes. Dance and Cruveilhier connected glanders with an inflammation of the lymphatics. Loiset found thrombosis in the lymphatics of the mucous membrane of the nose, and after that a tendency prevailed to consider glanders as a pyæmic disease. This new doctrine culminated in the hypothesis of Tessier, who denied the absorption of matter, substituted a formation of matter (pus) in the blood, and pronounced glanders as one of many diseases in which a tendency to produce matter is primarily existing in the blood. Finally clinical observations were made in France which removed (?) every doubt as to the pyæmic nature of glanders. Renault (*Recueil de méd. vétér.* 1835, p. 396) published observations, according to which glanders

proceeded from a fistule on the withers, from bruising of the upper eyelid, and from a fistule of the spermatic cord. Dupuy (*Bulletin de l'Académie de méd.*, 1836, p. 481) observed that glanders proceeded from a seton on the shoulder. Riss (*Recueil de méd. vétér.*, 1837, p. 602) observed several cases of glanders which were caused by severe contusions of the nose. Rey observed that glanders made its appearance after a fracture of the nasal and maxillary bones. Afterwards Renault and Bouley (*Recueil de méd. vétér.*, 1840, p. 257) endeavored to corroborate or to affirm these observations by direct experiments. They injected matter into the veins of horses, and claimed to have produced glanders-ulcers in the nose of a horse by such an injection of innocent matter. Rey (*Recueil de méd. vétér.*, 1867, p. 417) looks upon the experiment of Renault and Bouley as a singular case, but Professor Hering in Stuttgart (*Repertorium*, 1868, p. 36) does not find it singular at all, and says that he made the same experiments a long time ago, and had succeeded in producing in some cases glanders, in other cases suppuration (in the lungs), and in others no result at all. Such statements are, to say the least, exceedingly queer, particularly if made by such a learned and experienced man and otherwise so reliable an authority as Professor Hering, because such observations are, and must be, based upon a mistake either one way or another. There are three possibilities: Either the matter injected into the veins must have been taken from a horse affected with glanders or farcy, the animals experimented on must have been previously infected with the disease, or exposed in some way to the contagion. A previous infection must be considered as the most probable solution, because the horses subjected to such experiments are usually old or condemned animals bought for anatomical purposes at from two to four dollars a head, or the disease produced was no glanders at all. A great many experiments with injections of matter (pus) into the veins of horses—probably the most that ever have been undertaken—have been made at about the same time, but independently and at different places, by Professor Guenther in Hanover (*Nebel u. Vix Zeitschrift*, 2. B.) and Professor Spinola in Berlin (*Ueber das Vorkommen der Eiterknoten in den Lungen*, 1839). The same were afterwards repeated at various times by Professor Gerlach, the late director of the Royal Veterinary School in Berlin, who died in 1877. Neither of these three very reliable investigators nor anybody else, except Bouley and Hering, has ever succeeded in producing (!) glanders in a horse by an injection of innocent matter (pus) into the veins.

All those hypotheses and theories, notwithstanding some of them were only short-lived, contributed a great deal in creating the confusion in regard to the contagiousness or non-contagiousness of glanders (*la morve*), which, until recently, has been prevailing among the French veterinarians. Bouley separated acute glanders and chronic glanders as two distinct or entirely different diseases, and considered chronic glanders as non-contagious, and acute glanders and farcy as contagious and pyæmic diseases. Godine (*Elémens d'Hygiène vétérinaire, suivis de recherches sur la morve, etc.*, 1815), went still further, and denied the contagiousness of glanders altogether. Bouley, however, finally admitted that contagious acute glanders might, under certain circumstances, be developed from non-contagious chronic glanders. These fallacious doctrines of the professors of the Alfort veterinary school, not only caused great confusion in regard to diagnosis (glanders not being considered as a disease *sui generis*, was frequently confounded with other diseases), but also great losses, amounting to millions of dollars, to the people of France, by preventing a strict condemnation of glandered horses, and allowing thereby an unlimited spreading of the disease.

The veterinarians of Belgium, too, became infected with the French or rather Alfort confusion, otherwise they never would have stated in their official reports (*Bulletin du conseil supérieur d'agriculture du royaume de Belgique Arme*, 1858, Bruxelles, 1860), that of 810 glandered horses, 136 had been cured. The veterinary school of Lyons, France, has always kept aloof from the errors of the Alfort institution in regard to glanders, and has never denied the contagiousness of that disease.

The German veterinarians, though differing at times considerably in opinion as to the nature of glanders, have never doubted its contagiousness; and German governments have always been very strict in taking the most effective measures against the spreading of that terrible enemy of the equine race by requiring a prompt destruction of every horse reported by a veterinary surgeon as being affected with the disease. As a consequence, glanders has become a rare disease in Germany, and the annual losses are very insignificant.

Most of the older German veterinarians looked upon glanders as a dyscratic disease. Some believed they had found the immediate cause in a qualitative change of the animal albumen; others, in a morbid increase of fibrin. As to the morbid changes, some thought they had discovered something characteristic in a stagnation of lymph in the lymphatics, others in a formation of tubercles, and still others considered glanders as a product of scrofulosis. A few went even so far as to hold glanders to be identical with tuberculosis and scrofulosis. The tuberculosis doctrine originated in France, and gained a good many adherents willing to look upon glanders as an equine tuberculosis. The scrofulosis doctrine was based upon the erroneous supposition that glanders proceeds or develops from strangles or distemper, and that the latter is a scrofulous disease. Erdt (in his *Rotzdyscrasie und ihre verwandten Krankheiten*) declared glanders, as recently as 1863, to be a dyscratic disease, and discriminated a scrofulosis, blennorrhœic, septicamic, carcinomatous, syphylitic, and other forms of glanders, but considered scrofulosis glanders as the generic form. Professor Gerlach, in his valuable treatise from which several of the notes just given have been taken, refutes the theories of Erdt by the following statement, for the correctness of which I can vouch from my own knowledge of the facts:

The breed of the milk-white (white-born) horses of the royal stables of the late Kings of Hanover was kept pure by continuous in-and-in breeding. As a consequence more than half of the number of colts born perished every year of scrofulosis diseases. At the *post-mortem* examinations the mesenterial glands presented every stage of scrofulosis from simple swelling to a cheesy degeneration. Still, never a case of glanders has occurred, neither among the colts nor among the grown horses. This proves that scrofulosis really makes its appearance in colts, and that in exactly the same form as in children, and that it is therefore not justifiable to attribute an entirely different disease of horses to scrofulosis.

For our present better knowledge of the nature and the morbid anatomy of glanders we are indebted especially to the thorough, unbiased, and scientific researches and investigations of Professors Virchow (*Handbuch der speciellen Pathologie*, Bd. 2, and *Die krankhaften Geschwülste*, Bd. 2); Leisering (*Bericht ueber das Veterinairwesen im Koenigreich Sachsen*, 1862 and 1867); Ravitsch (*Virchow's Archiv*, Bd. 23); Kolop, (*Magazin von Gurlt und Hertwig* Bd. 30), and Gerlach (*Jahresbericht der Koenigl. Thierarzneischule zu Hannover*, 1868).

THE MORBID PROCESS.

Glanders commences as a neoplastic process—new morbid formations (glanders-cells) are produced. The mucous membrane of the respira-

tory passage, the lungs, the subcutaneous tissue and the cutis, and, occasionally, some of the connective tissues of other parts of the body, constitute the primary seat of the morbid changes. The lymphatic vessels and glands become secondarily affected. The neoplastic process, however, does not in every case of glanders occur in all those tissues named; its seat in a certain tissue determines the form of the disease. In common or nasal glanders the morbid changes have their main seat in the mucous membrane of the nasal cavities, and of the maxillary sinuses; in pulmonal glanders the same make their appearance principally in the lungs; and in farcy the neoplastic process is taking place either in the subcutaneous connective tissue (common farcy), or in the cutis itself (skin-farcy). In other tissues, morbid changes, as a general rule, occur only if glanders has become complicated with another disease—an inflammatory process, for instance. The products of the neoplastic process consist of round cells, and of spindle-shaped cells. The latter, usually, undergo further changes; some of them develop to round cells, and others serve as the elements of excessive or morbid growths of connective tissue, which, however, do not present anything characteristic, and must be considered as subordinate products of the neoplastic process. The round cells are in shape and form similar to granulation-cells and matter-corpuscles, but vary in size from that of the latter to two, three, four, five, and in some cases even ten times as large. The youngest round-cells, or those latest produced, present rather delicate outlines, and are the smallest; the oldest ones, which are distinguished by their granulated contents and their dark color, are the largest, and sometimes very large. All have large nuclei, which grow in the same proportion as the cells, and present in the older ones a dark, granulated appearance. (Fig. I, No. 4, and Fig. III, No. 6.)

The formation of these cells constitutes the real formation of all the morbid changes in glanders, and may, therefore, be considered as something characteristic of the disease, and the cells themselves are appropriately designated as glander-cells. These glander-cells have two different sources; they proceed from connective-tissue corpuscles, and also from epithelium-cells.

1. *Development of glanders-cells from connective-tissue corpuscles.*—The latter become proliferous and swell; the nucleus of each cell or corpuscle grows larger; a second and a third nucleus are produced within the walls of the cell, but not by a division of the first one. The other contents of the cell gradually granulate, the appendages or extensions drop off; finally the whole body of the cell decays. The nuclei become free; the nucleus-envelope or membrane expands, and becomes distinct from the interior, and the metamorphosis of a nucleus into a nucleated cell is thus completed. Such a new cell presents at first a very delicate contour and a large and bright nucleus, but, under favorable circumstances, will soon become firmer and grow larger. Under unfavorable conditions no further development will take place. (Fig. I, Nos. 1 and 4.)

2. *Development of glanders-cells from epithelium-cells.*—A process of proliferation makes its appearance in the tessellated and cylindrical epithelium-cells, is plainest, however, in the latter. At first the oval nucleus increases in size; then a second, and finally a third nucleus are formed at a little distance from the upper obtuse end of the first, which is not divided. The formation and growth of these nuclei cause the cylindrical cell to increase in size, or to swell, and to change its original shape till it is transformed to a mere bag filled with nuclei and small round cells. Finally the bag or the old cell-membrane decays and breaks, and the nuclei and young cells are liberated. (Fig. III, Nos. 1

and 4.) Such a production or development of glanders-cells just described can take place in young or undeveloped and incipient epithelium-cells, because round giant-cells filled with nuclei and small round cells are formed frequently in the deeper or youngest strata of the epithelium. (Fig. III, No. 5.)

Wherever such a neoplastic growth is making its appearance the process is always essentially the same. The original nuclei of the primary epithelium-cells and connective tissue-corpuscles increase in size, and new nuclei are formed within the external membrane, or envelope, of the primary cells. These nuclei are transformed into small round cells, which are liberated by the decay of the old mother or brood-cells, and constitute what is called daughter-cells, and grow larger. This growth and development constitutes a characteristic peculiarity of the large round glanders-cells, which distinguishes the same from otherwise similar granulation-cells, matter-corpuscles, and tubercle-cells, because the latter, during their whole existence, remain unchanged at their first stages of development. Although young glanders-cells are small, and large ones old, the difference in size does not depend exclusively upon the age of the cells. Other growth-promoting and growth-retarding influences must be existing, because some cells grow faster than others, and some do not seem to grow at all. Under certain circumstances only small cells can be found, which are not different from common matter corpuscles, and in other cases a great many large ones, sometimes of an extraordinary size, present themselves. If the morbid process is a violent or a very rapid one, the glanders-cells are always small; rapid development and a fluid intercellular substance constitute the agencies which deprive the cells of their ability to grow, or cause them to remain small, and of a somewhat uniform size. Consequently, in all those cases in which the morbid process of glanders is blended from the beginning with more or less inflammation and exudation, the glanders-cells will be small and numerous; and as the inflammatory exudations destroy and dissolve the intercellular substance, the latter and the exudations themselves will constitute a fluid in which the glanders-cells are kept suspended. The glanders-matter thus formed does not present, under the microscope, any characteristic differences from any other matter or pus. A production of glanders-matter and of numerous small glanders-cells is common if the neoplastic process has its seat in the subcutaneous and intermuscular connective tissues consequent in farcy. In all those cases, however, in which glanders presents itself as a chronic disease, free from any complications with inflammatory processes, &c., whatever, in which the formation of the glanders-cells is a gradual and slow one, and in which the intercellular substance is not destroyed and dissolved, the glanders-cells will grow to a certain size, and young cells with delicate contours and large, bright nuclei, older and larger ones, and very large ones with dark-colored nuclei and granulated contents, will present themselves.

The vitality of the neoplastic products of glanders is limited, but differs considerably according to circumstances. The small, rapidly produced, and therefore numerous, cells, suspended in a dissolved intercellular tissue and exudations, are similar in every respect to matter-corpuscles; the same not only do not grow, but shrink and decay very soon. If the intercellular substance does not decay, but retains its original connective properties, the glanders-cells not only grow larger, but also a great deal older, than matter-corpuscles or tubercle-cells. This vitality will be the greater the larger the space or the greater the amount of the connective intercellular substance between the single cells. Their

age, however, probably never exceeds a year or several months, notwithstanding that some glanders-nodules, tubercles, and tumors may exist, apparently unchanged, a much longer time, because the constituents of the latter, the glanders-cells, change. Old ones decay, and new ones take their place even if the whole tubercle or tumor remains essentially as it is. It is to be supposed that such a change is taking place, because every old glanders-tubercle or tumor contains always old and new cells in different stages of development.

The retrogressive metamorphosis may be called a fatty necrobiosis. At first small granules (fat granules) make their appearance in the nuclei; the latter swell or increase in size, and grow darker; granules appear also within the cells, but outside of the nuclei; finally the envelopes or external membranes of the cells decay and fall to pieces, and a granulated detritus is left behind. Therefore, after a regressive metamorphosis has set in, the glanders-nodules or tubercles and tumors are found to contain a granulated detritus, small and large granulated cells, and free granulated nuclei, if examined under the microscope. The glanders-cells may thus perish or be destroyed without any simultaneous decay of the intercellular substance. In such a case the further changes which are going on in the tissues, in which the glanders-cells are imbedded, differ according to circumstances. If the glanders-cells are but few, and rather far apart, the granulated detritus is removed by absorption, and the morbid process comes to a termination by local healing. In other cases new glanders-cells are produced, and take the place of the old ones, and the morbid growth (tubercle or tumor) continues to exist. If the decaying glanders-cells are numerous and lodged close together, the retrogressive metamorphosis is usually attended with a morbid or excessive growth or production of intercellular connective tissue; and the absorption of the detritus in such a case is attended with, and makes room for, a somewhat extensive production of new fibrous (scar) tissue; linear and somewhat prominent, white stripes, usually uniting in a common center, corresponding to the center of the former neoplastic process, make their appearance and constitute a star-shaped, whitish scar or cicatrix. In chronic glanders such cicatrices occur very often in the mucous membrane of the septum; the hard, fibroid, and callous swellings, which are sometimes found in the mucous membrane of the nose, and the fibroid tumors which occur in the lungs, and which are easily distinguished from the more pulpy glanders. Nodules and tumors are produced in the same way.

Frequently, however, that is, in all such tubercles and tumors in which the glanders-cells are numerous and separated only by very little intercellular tissue, the decay or retrogressive metamorphosis of the glanders-cells involves and causes a simultaneous decay and destruction of the intercellular substance, and of the tissue in which the morbid products are imbedded. The continuity is destroyed, and an abscess is formed. The decay usually, though not necessarily, begins in the center of the indus of cells, and it seems that certain external influences are able to change or to accelerate the whole process. So, for instance, a general decay or a formation of ulcers or abscesses does not usually take place in the mucous membrane of the maxillary cavities, but almost invariably, or, at any rate, a great deal earlier in such parts of the nasal mucous membrane, which are exposed to the current of air passing through the nose at each breath. The irritation caused by the passage of air probably constitutes the cause of the more frequent occurrence of glanders-ulcers in the mucous membrane of the septum than in any

other part of the nasal mucous membrane. If glanders has become complicated with inflammation, the whole process, as has already been mentioned, is entirely different. In farcy, too, in which the morbid changes have their seat in the loose subcutaneous connective tissue, the abscesses are formed in a somewhat different way.

The infectiousness of the neoplastic products of glanders constitutes a specific and pathognomonic attribute of the same, which excludes identification with any other otherwise similar neoplastic or morbid products. The same specific agency, or the same virus, which is instrumental in communicating the disease from one animal to another, constitutes also the cause which spreads the morbid process within the organism of the affected animal. The efficiency does not seem to be dependent upon any particular shape or form of the morbid products, but to be inherent in the material, because not only the live glanders-cells, but also the dead or decayed ones, the granulated and cheesy detritus, and the watery transudations are infectious. The immediate changes produced by a local infection within the tissue, or the creeping of the morbid process from cell to cell, can be seen only under the microscope. If the glanders-process is not complicated, that is, if no other disease is existing, the spreading of the morbid process, or the progress of the local infection, is a very slow one, but is accelerated or becomes rapid if a complication sets in. The morbid process, however, spreads not only by means of a direct infection from cell to cell, but also by means of the lymphatics, which absorb infectious elements and deposit the same in the nearest lymphatic glands. That this is the case becomes evident if an animal is inoculated with glanders-virus. The lymphatics proceeding from the inoculation wound soon commence to swell like strands or chords, and undergo not seldom ulcerous decay. The lymphatic glands, too, commence to swell to solid and painful tumors which afterwards become harder and firmer, but less painful. A morbid production of connective tissue causes the firmness of the swelling, and usually renders such a diseased gland impervious to a further passage of the contents (lymph and infectious glanders elements) of the lymphatics, and prevents, therefore, a further spreading of the infection. If, however, a lymphatic gland thus degenerated becomes finally itself a seat of the neoplastic glanders process, or of the production of glanders-cells, the lymphatics which pass from that gland to another one will also absorb infectious material, and cause thereby a further spreading of the infection and of the morbid process. In nasal glanders, a swelling of the submaxillary lymphatic glands (which receive directly through the lymphatic vessels the lymph from the seat of the morbid process), unattended with any affection whatever of the lymphatics beyond them, is a very frequent occurrence. Hence the spreading of the morbid process by means of the lymphatics is also a usually slow one in chronic glanders; several months may elapse before a new source of infection is formed. The spreading, however, will be a comparatively rapid one in all cases of glanders in which a complication with another destructive or acute disease, as an inflammatory process, has taken place. The morbid process is also apt to spread more rapidly through the lymphatics in common farcy in which loose connective tissue constitutes the seat of the disease. The morbid process of glanders, therefore, is infectious; a spreading of the same is not only effected within the tissue by a propagation of the glanders-cells, but also by means of the lymphatics which absorb the virus and carry the same to the nearest lymphatic glands, where the progress of the morbid process stops if the latter are degenerated by an excessive production of connective

tissue, but proceeds further if those glands become the seat of a neoplastic production of glanders-cells, as is usually the case in farcy, and always if glanders is complicated with inflammation. It is evident that by such a spreading of the virus and absorption of deleterious glanders-matter some infectious elements, whatever their nature may be, will finally pass into the blood, and cause in that way a general disorder, or a general dyscratic condition usually called "glanders-dyscrasy." That virus or infectious elements pass over into the blood, and pervade the whole animal organism, becomes apparent by the fact that the blood and the various animal secretions, the sweat for instance, possess contagious properties already at an early stage of the disease, or before the morbid process has spread much beyond its original seat, and are able to communicate the glanders from one animal to another. It may appear to be somewhat strange that the early infectiousness of the blood and of the various secretions does not effect a general outbreak of the glanders-process in every suitable part (mucous membranes and connective tissues) of the animal body, and that, notwithstanding the facility with which the glanders-contagion communicates the disease from one animal to another, the morbid process remains usually for a long time confined to certain parts of the organism. It is, however, not any more surprising than a healing, or a cessation of the morbid process, of other equally contagious diseases—pleuro-pneumonia of cattle for instance—while the organism is yet replete with the contagion, which, in very small quantities, is able to communicate the morbid process to other animals. The truth is, our knowledge concerning the true nature of the contagious principle of the various contagious diseases is yet too limited. If the theories of Hallier and others, based upon the discovery of micrococci, &c., in the blood and in the secretions of animals affected with contagious diseases should prove to be correct; if, in other words, those micrococci—in glanders *Malleomyces equestris*, H.—do constitute the infectious elements, and the real, immediate cause of the morbid changes, all those strange phenomena may yet find a satisfactory explanation. If, however, those micrococci should not constitute the contagious, and should not be the cause of the morbid process, but the product of the same, or if their presence should prove to be a merely accidental one, it will be difficult to reconcile those facts. Professor Gerlach, who discards those theories as unfounded, hints at an exhaustion of predisposition as affording a possible explanation.

THE ANATOMICAL CHANGES.—The morbid products of the glanders-process make their appearance usually in more or less distinctly limited nests, or in shape of nodules or tubercles and tumors, which vary considerably in size. Some of them are as small as the size of a pin's head, and are called miliary tubercles; others are larger, of the size of a pea; and still others are quite large, and constitute tumors or glanders-excrecences. Practically, therefore, a discrimination between glanders-tubercles or small nests of glanders-cells, and tumors or large ones, is admissible. The former, however, must not be looked upon as identical with genuine tubercles as occurring in tuberculosis. A glanders-tubercle is a different thing altogether, only the name has become too convenient to be abolished. Glanders-tubercles occur—1, in the substance and in the subserous tissue of the lungs; 2, in the mucous membrane of the nasal cavities and of the maxillary sinuses, but especially in the mucous membrane of the septum; 3, in the swelled and indurated submaxillary glands; and, 4, in the cutis. Some authors have considered the presence of small miliary tubercles in the lungs as the criterion of the presence of glanders, but others have

found that glanders may exist and still no tubercles may be found in the lungs. Professor Roell, in Vienna, found military tubercles in only about 66 per cent. of all cases that came under his observation, and Professor Leisering, in Dresden, and Professor Gerlach, in Berlin, searched for them frequently in vain. Glanders-tubercles make their appearance in the lungs only if the morbid process, which has its principal seat usually—I would like to say, normally—in the mucous membrane of the nose, extends to the lungs; or if original nasal glanders has become complicated with pulmonal glanders, which, in the course of time, is a common occurrence. In those cases in which such a complication is existing from the beginning, or in which pulmonal glanders constitutes the primary disease and nasal glanders the complication, military tubercles are found in the lungs frequently within a short time after an infection has taken place, sometimes within from one to three weeks. The same are imbedded in the healthy pulmonal tissue, are surrounded by a court of turgid blood-vessels (Fig. VII, No. 1), have each a small blood-vessel of their own, are at first grayish-white and rather soft, consist of more or less uniform and rather small round cells, with nuclei, connected with each other by a delicate intercellular tissue, and become, when older, enveloped by a fine tissue of connective fibers. The court of turgid or congested vessels around the tubercles disappears after some time, the blood-vessel which enters the tubercle becomes obliterated, and the substance of the latter, receiving no more nutriment, undergoes decay. A necrobiotic process commences, the round cells shrink, the intercellular substance decays, and the interior of the tubercle is changed to a cheesy substance, in which finally lime-salts are deposited. The whole process is the same as that which is taking place in a true tubercle in tuberculosis, therefore every difference disappears after the retrogressive process has set in. Hence, glanders-tubercles have frequently been identified with veritable or tuberculosis tubercles, and glanders itself has, at times, been looked upon as a tuberculosis of horses, which assumes peculiar forms, different from tuberculosis of other animals; but as real common tuberculosis occurs in horses as an independent disease, the same as in other animals, as the cells of a glanders-tubercle are usually somewhat larger than those of a genuine (tuberculosis) tubercle, and as, finally, each glanders-tubercle possesses a full intercellular substance, and has a blood-vessel of its own, either of which is wanting in the veritable (tuberculosis) tubercle, there can be no doubt as to glanders and tuberculosis of horses being entirely different diseases. Besides that, in tuberculosis of horses, the single tubercles are usually a great deal larger than the military tubercles of glanders, and only the smallest ones (those of the size of a pea) present some similarity to the larger glanders-tubercles. The retrogressive process does not present anything characteristic.

In the mucous membrane of the nose the glanders-tubercles or nodules are always plainest on the septum (Fig. IV, Nos. 1 and 2). They, too, vary in size from that of a pin's head to that of a pea, and project but little over the surface of the membrane, and are therefore sometimes scarcely visible. At a *post mortem* examination, however, the same can be seen and felt more plainly, because then the mucous membrane is less succulent and swelled. Either singly or in groups they are imbedded in the mucous membrane, usually in the upper layer, and are distinguished from the reddened membrane by their gray, grayish-white, or grayish-yellow color. Sometimes these tubercles, or glanders-nodules, are situated deeper, in the middle or lower layer of the mucosa, and therefore less distinctly circumscribed, and indicated only by a slight elevation

above the surface of the membrane, but not by any distinct color. On a cut, however, the same can be seen very plainly (Fig. V, *a* and *b*). The substance of the glanders-nodules in the nose is more or less soft, and consists of round cells, free nuclei, spindle-shaped cells, and a fine connective intercellular substance. The spindle-shaped cells are lodged mostly side by side; some of them, the younger ones, are rather thin, and others are swelled in the middle, and are ripe and near breaking. The nodules or glanders-tubercles present usually a gray-yellowish color, if composed principally of round cells, and their color is somewhat indistinct if spindle-shaped cells constitute the prevailing element. The retrogressive metamorphosis consists in a decaying to a fatty or cheesy substance. A real shrinking and exsiccation and a deposit of lime-salts do not occur. Glanders nodules or tubercles in the cutis are a comparatively rare occurrence in horses, but are observed very often in human beings affected with glanders. As the skin of horses is coated with hair, only the larger tubercles or nodules will be noticed; the very small ones usually escape observation till the regressive process has been completed, and has changed them to small lenticular ulcers. Otherwise the morbid changes are the same as in the mucous membrane.

Miliary tubercles, finally, can also be found imbedded frequently in the morbidly increased connective tissue of the indurated submaxillary and other lymphatic glands. On a cut the same can frequently be pressed out of the surrounding tissue as small knots or nodules. An exsiccation is a frequent occurrence, but a deposit of lime-salts has not yet been observed.

Glanders-tumors, or very large nests of glanders-cells, can be found fully developed only in the lungs, but are even then not as frequent as the tubercles. They have their seat usually immediately beneath the pulmonic pleura, especially toward the lower sharp border of the lungs. In some cases, however, the same are also found imbedded in the pulmonic tissue, and are then not often numerous. The tumors, or glanders growths, are either distinctly limited, and varying in size from that of a cherry to that of an apple, or the same are more or less diffuse. The large tumors seem to be composed of two or more smaller ones which have increased in size till they have come in contact with each other and have united. The intermediate pulmonic tissue in such a case has disappeared. Large tumors thus produced are frequently of an irregular shape. The pulmonic tissue surrounding the gray or grayish-yellow tumors is at first hyperæmic, and the outlines of the latter are more or less indistinct, but afterwards the same become more defined. On a cut these tumors present an appearance somewhat similar to bacon. In some cases the same are more or less firm and solid, like a fibroid growth, and in others of the consistency of a sarcoma. (Fig. VII, No. 2, presents the grayish-yellow cut surface of a glanders-tumor in natural size, for the most part distinctly limited from the hyperæmic pulmonic tissue, but at one end yet encroaching upon the latter, and not yet presenting a distinct demarcation. Fig. VI, No. 3, is a smaller glanders-tumor in natural size, presenting yet visible, small, round, primary nodules and some remnants of pulmonic tissue, indicating plainly that the growth takes place, not from one but from several centers, and is not effected by peripheric apposition.) Under the microscope the constituents are found to be essentially the same as those of the smaller nodules or tubercles. The round cells, however, vary much more in size. Some are very large and distinguished by their dark and granulated nuclei. Numerous epithelial mother-cells, containing nuclei and incipient cells, spindle-shaped cells in different stages of development, some, maybe,

very much swelled or just breaking, and others decayed and discharging their granulated contents and large nuclei, and a connective intercellular substance which gives the whole tumor its continuity and a certain degree of solidity, constitute the principal components. The softer glanders-tumors, similar in consistency to a sarcoma, are composed mainly of round cells, while the firmer or more solid ones consist principally of spindle-shaped cells, and contain comparatively few round cells imbedded in the intercellular substance, which latter is here and there fibrous and solid, and thereby the cause of the greater firmness. The presence of both kinds of cells, spindle-shaped and large, round ones, proves that connective-tissue corpuscles, as well as epithelium elements, contribute to the formation of pulmoal glanders-tumors. The retrogressive metamorphosis proceeds, according to the observations of Gerlach, in two different ways. Sometimes all components of the glanders-tumor, the intercellular substance as well as the glanders cells, undergo a process of decay which proceeds either from one center—if the tumor is a simple one—or from several centers simultaneously, if the tumor is a complicated one. In the former case the whole tumor is changed to one cavity with cheesy contents, but in the latter two or more larger or smaller cavities, corresponding to the number of the original tubercles or tumors, are produced. The contents of the same present also a cheesy appearance. Sometimes, however, the whole process is different. The round-cells decay and are absorbed, and an excessive growth or production of connective tissue is taking place. The tumor becomes harder and firmer, and assumes finally the characteristics of a fibroid growth, which contains interspersed in its tissue a few round-cells, and may not undergo any further changes for a long time. Such fibroid tumors correspond to the fibroid cicatrices which occur frequently in the mucous membrane of the septum, and are found not seldom if the morbid process has been a very slow or chronic one. If glanders is acute or complicated with other morbid processes which accelerate its progress, such hard and firm fibroid tumors or cicatrices are never formed. On the contrary, the glanders-tumors decay rapidly, often before the same have had time to assume definite shape and form.

Glanders-ulcers or abscesses are produced if the intercellular substance of the tubercles undergoes dissolution. Dissolved intercellular substance and decayed and decaying glanders-cells constitute the matter. The process is about as follows:

Farcy-ulcers in the subcutaneous connective tissue. The development or the growth of a farcy-tumor is always attended with some local inflammation in the surrounding tissues. A violent proliferation begins in the center of the tumor, and numerous small round-cells which can scarcely be discriminated from matter-corpuscles are produced. The inflammatory process furnishes a sufficient quantity of exudation to loosen and to envelope the round-cells almost immediately after the same have been produced. Some white blood-corpuscles may become intermixed, but the same must be regarded as strangers, because a very large majority of the cells suspended in the fluid exudation are the product of the proliferous process. So it may happen that a farcy boil or tumor shows fluctuation, and contains matter within a few days, or is changed to an abscess much sooner than a common boil. The matter of a farcy-ulcer does not exhibit any distinctive difference from other pus except in so far as it possesses infectious qualities. Almost as soon as a farcy-boil has been changed to an abscess, or contains matter, the nearest subcutaneous lymphatics commence to swell to plainly visible chords or strands, and in their course not seldom new boils are formed,

which also undergo the same metamorphosis as the first one. Hence it happens very frequently that farcy boils and ulcers make their appearance in rows somewhat resembling strings of beads, which constitutes one of the characteristics of the disease. A little later the nearest lymphatic glands, too, commence to swell and to be changed to hard and more or less painful farcy-buboes. The circulation or the current of lymph in the lymphatics of such a swelled gland or glands becomes interrupted, and in consequence oedematous swellings make their appearance in the parts in which such an interruption has been effected, usually in a leg. The swelling of the lymphatics and of the lymphatic glands, the lymphatic abscesses, and the appearance of oedemata have led to mistakes; an inflammation of the lymphatics has been supposed to constitute the primary and the production of farcy-ulcers a secondary morbid process. Sometimes, it is true, it is rather difficult to find the primary boils or ulcers from which the morbid process has spread. The comparatively rapid dissemination of the glanders-virus through the lymphatics in the loose subcutaneous connective tissue explains why farcy usually spreads sooner over the whole body, and becomes fatal in much less time than either pulmonary or nasal glanders.

The products of the glanders-process, however, do not always present themselves as distinctly limited growths in form of nodules, tubercles, tumors, and boils. The morbid products in certain cases, especially in such in which an inflammatory exudation is taking place in the same parts in which the glanders-process has its seat, become diffuse, and the glanders-cells almost as soon as produced are carried off by the exudation. Gerlach discriminates two forms of diffuse glanders, viz., glanders-catarrh and diffuse production of glanders-cells in the mucous membranes.

1. *Glanders-catarrh*.—If the glanders-process makes its appearance in a mucous membrane, the first morbid changes and symptoms are always those of glanders, blended with a catarrhal affection. Consequently the first stage of nasal glanders may appropriately be called a "glanders-catarrh," and may under favorable circumstances exist almost unchanged for a long time without being attended by any other characteristic symptoms except perhaps some swelling of the submaxillary lymphatic glands (so-called nasal gleet). Afterward, in a more advanced stage of the disease, more characteristic morbid changes make their appearance, but the catarrhal discharge from the nose remains. In glanders-catarrh the secretions of the nasal mucous membrane differ only in so far from those observed in a common catarrh as they present frequently a greenish or green-yellowish color, and contain very soon epithelium-scales and small, round glanders-cells similar to matter-corpuscles. With the appearance of the epithelium *débris*, however, the somewhat characteristic greenish color usually disappears. The glanders-cells have their source in the epithelium-producing layer of the mucosa, and develop from epithelium-cells, but are carried off or washed away by the fluid exudations. Still the discharge itself, although containing glanders-cells, offers no characteristic of great diagnostic value except its infectiousness, which exists from the very beginning. The microscope reveals no essential differences, neither between the nasal discharges in glanders and in catarrh nor between farcy matter and common pus.

2. *Diffuse production of glanders-cells in the mucous membrane*.—The glanders-cells are not produced in certain limited spots or nests, but in diffusion over large parts of the mucous membrane. The latter appears swelled and loosened in its tissue, and contains larger or smaller numbers of round glanders-cells of different size. Afterwards an exuberant

morbid growth of connective tissue makes its appearance, which causes the mucous membrane to become more or less thick and callous. If the glanders-process extends to the frontal and maxillary cavities, the naturally fine mucous membrane, especially of the latter, is usually found coated with a muco-purulent secretion, and presents more or less uneven swelling and degeneration, caused by an exuberant neoplastic production of connective tissue elements. In the nasal cavity, but especially on the septum, the diffuse glanders-process penetrates not seldom the whole mucous membrane, and extends to the submucosa. Callous swellings are formed by an exuberant production of neoplastic elements of connective tissue, and within these swellings appear diffuse center-stations, or nests of round cells, which (latter) gradually undergo decay and are absorbed. Fibrous or scar-tissue, which afterwards shrinks or contracts to a scar or cicatrix, takes their place. So it may happen that scars or cicatrices make their appearance without any ulceration having preceded. These scars or cicatrices usually contain a center, from which several whitish strands of fibrous tissue, produced by the same process, are radiating in different directions. Still not every scar or cicatrix found on the mucous membrane of the septum has been produced in the same way, without any preceding ulceration. Under favorable circumstances a healing even of a glanders-ulcer will now and then be effected, but in such a case the scar left behind is usually less prominent or conspicuous, and is destitute of such long radiating strands of fibrous tissue.

Glanders-ulcers.—The same, if present, constitute the most characteristic and unmistakable morbid change of the whole morbid process, and are found usually in the mucous membrane of the septum, especially toward the nasal bones, but also in the mucous membrane of the conchæ, the nasal ducts, the larynx, and the windpipe, and, in rare cases, in the cutis. Professor Gerlach says he has found ulcers in the mucosa of the throat and windpipe only in acute glanders. I remember one of chronic glanders that occurred in 1869 in Quincy, Ill., in which, at the *post-mortem* examination, numerous ulcers presented themselves in the nasal ducts and in the mucous membrane of the larynx and windpipe, but none on the septum. In that horse the only observable symptom consisted, for a long time, in difficulty of breathing, resembling a kind of roaring when exercised. The *post-mortem* examination, made by myself, revealed glanders in a very advanced stage of development, notwithstanding that the horse, a fine black roadster, was not suspected of being affected with glanders up to within two weeks before he was killed.

Glanders-ulcers are always preceded by glanders-nodules or tubercles in the mucous membrane or skin, respectively, and are the product of a decay of the glanders-cells and a dissolution of the intercellular substance of those nodules or tubercles. The process, however, by which these ulcers are developed is not always the same, but varies somewhat according to the size and situation of the tubercles. If the latter are large, of the size of a pea, and extend deep into the mucous membrane, a depression, which soon changes to a small hole, at first not larger than a pin's head, makes its appearance in the middle of the external surface. This hole, however, soon grows larger (Fig. IV, No. 2), and constitutes within a few days an ulcer corresponding in size to that of the former tubercle (Fig. IV, No. 3). The deeper the latter extends into the mucosa or submucosa the deeper will also be the ulcer.

If the glanders-tubercles are very small and superficial, or, as it sometimes happens, visible only as gray specks or dots, the proceeding is a little different. At first the epithelium is cast off; a small, scarcely

visible loss of substance takes place, which gives the incipient ulcer the appearance of a small erosion. In other cases the decayed, superficial part of the tubercle presents itself as a yellowish-gray mass, which remains for a short time coated with epithelium. The decaying tubercle, in such a case, has the appearance of a small pustule. In both cases, finally, small, flat, lenticular ulcers are formed, which, if numerous and close together, as frequently happens (glanders-tubercles, if very small, are usually situated close together in groups), become soon confluent, and present then one large, flat ulcer with an uneven bottom. A few days ago I had an opportunity to observe small lenticular, and one medium-sized confluent ulcer, on the right side of the septum of the nose of a former circus-horse that had been affected with glanders—had had discharges from the nose—for over eight months.

A glanders-ulcer once formed grows in depth and circumference as follows: At the bottom and on the borders of the ulcer, and also in the immediate neighborhood of the same, appear again gray specks and nodules (nests of round cells), which also undergo decay, become confluent with the ulcer, and increase thereby the size and depth of the latter. The bottom of a glanders-ulcer presents a grayish-yellow (bacon-like) appearance, marked with red blotches, and is composed mainly of round glanders-cells, the decay of which adds to the depths of the ulcer. Consequently, as after each decay new round cells make their appearance, a glanders-ulcer is not only able to work its way through the mucous membrane and its connective tissue, but also into and even through the cartilagenous septum and the osseous conchæ. This, however, takes place only in a very advanced stage of the disease, and under the influence of a complication with an inflammatory process. The bottom of a deep ulcer presents usually a dirty appearance, caused by decay or decomposition of tissue and blood (Fig. IV, No. 4). Growth of a glanders-ulcer in circumference is a very common occurrence. The process is usually a rapid one, if the ulcer is composed originally of small lenticular ulcers, so-called erosions, with corroded gray or inflamed and red borders. If two or more of such compound ulcers happen to be in close proximity of each other, the same very often become confluent in a comparatively short time, and present then one large ulcerating surface. In the cutis the ulceration process is exactly the same, and is invariably preceded by a formation of glanders-tubercles. The latter have their seat usually in the skin of the lips and nostrils, seldom in the skin of the legs and of other parts of the body. In the cutis, too, deep ulcers and flat and lenticular ones can be discriminated. In some cases the cutis-ulcers have a special tendency to increase in depth—if the preceding tubercles have been large—while in others a tendency to grow in circumference is prevailing. The latter is the case especially if the tubercles have been small and close together. Both kinds of ulcers, however, like those in the mucous membrane, produce abundant exudation and matter, a peculiarity by which deep glanders-ulcers situated in the skin are easily discriminated from farcy-ulcers or glanders-abscesses. Besides that, the latter are always kettle-shaped, have red and elevated borders, and are situated in the subcutaneous connective tissue, while the former have their seat in the skin.

THE CAUSES AND ORIGIN OF GLANDERS.

As to the causes and origin of glanders, opinions, especially in former times, have differed very widely. A great many veterinarians, particularly in France, and there until quite recently, either denied its conta-

giousness altogether (La Fosse, sen. and jun., Fromage Defeugre, and Dupny barely admitted the possibility of an infection; Coleman (English), Smith (English), and Rodet considered only acute glanders as a contagious disease, as did Hutrel d'Arboval and many others), or expressed doubt as to the existence of a contagion.—Dutz. Consequently a spontaneous development or the possibility of the same was not questioned except by a few decided contagionists, such as Volpi in Italy, White in England, and, in modern times, Gerlach in Germany. Nearly all German, most of the English, and a great many French veterinarians (it is but just to mention among the latter Solleysel (1669), De Saunier (1734), Bourgelat (1765), Garsault (1770), Vitet (1783), Gohier (1813), Delwart, and Leblanc) admitted that most cases of glanders owe their origin to infection, but did not doubt the possibility of a protopathic, and even of a deutropathic development. Even at the present day an auchtochthonous and a deuteropathic development, too, are looked upon as something possible, or even self-evident and of frequent occurrence, not only by non-professional men, but also by a great many veterinarians of high standing. As causes of auchtochthonous glanders, all possible injurious agencies have been accused, the same as in all other contagious diseases, such as pleuropneumonia of cattle, for instance, which latter, as is now more generally admitted, spreads, and is caused exclusively by infection or by means of the contagion. The principal causes of glanders have been considered spoiled, decayed, and insufficient food, or food of a bad quality or unsuitable composition; dirty, crowded, and ill-ventilated stables; overwork, hardships, and exposure of any kind or description; in short, nearly everything that is calculated to have an injurious effect upon the animal organism. A great many horses in every country and in every clime are exposed to some or to all of the injurious influences just enumerated, and there is not the least doubt that these influences are well able to weaken the constitution of an animal, to produce emaciation and debility, and to cause a whole army of more or less dangerous and frequently fatal diseases, but still glanders is not any more frequent among horses thus exposed and suffering than among others which are well kept and well treated in every respect. In every country and in every clime a larger or smaller number of horses are exposed to all those injuries mentioned, are worked to death, starved to death, suffocated to death in foul stable-air, poisoned to death with spoiled food and with impure, stagnant water, and still there are countries in which glanders is an unknown, or, at least, an exceedingly rare disease, while in other countries in which horses, on an average, are not kept any worse, or, may be, are kept much better, glanders is a very frequent disease, and causes annually great losses. As a general rule, which, however, suffers apparent exceptions as I shall show hereafter, glanders is frequent in all those countries in which a great many horses are imported, and rare in all those countries in which more horses are raised than needed, or from which horses are exported. Besides that, nobody has ever succeeded in producing glanders by merely exposing or subjecting a horse that has never been exposed to the influence of glanders-contagion to any or to all the injurious agencies and influences which have been mentioned as being accused as the causes of protopathic glanders. In the West, where I have lived and practiced during the last thirteen years, glanders, as I have been informed by reliable persons, used to be an almost unknown disease before the civil war, but has been spread by condemned army horses during and immediately after the war, and is now frequent and can be found everywhere.

Among asses and mules glanders is comparatively not as frequent a

disease as among horses, notwithstanding that the former have more predisposition, are easier and sooner infected, and succumb quicker. If a protopathic development were possible, or frequently taking place, one would suppose that it would occur especially in those animals (asses and mules) which possess the greatest predisposition, or, in which, if affected, the morbid process is always the most rapid and the most violent. Besides that, asses and mules particularly, are, as a general rule, more exposed to bad treatment and to all those calamities which have been looked upon as probable causes of glanders, than horses. That glanders is not so frequent among asses and mules as among horses, is simply due to the fact that the former are less numerous and usually less exposed to the contagion, because less used on the road and for traveling purposes, than horses. An exception, perhaps, may be made with the American army, or with any other army in which mules are extensively employed, and in them, I suppose, cases of glanders are just as frequent, and perhaps more frequent among the mules than among the horses.

In modern times, most veterinary writers, it seems, have abandoned the possibility of an autochthonous or idiopathic origin of glanders, but the deuteropathic development is yet upheld by a great many. The diseases supposed to terminate in glanders are especially strangles or distemper, influenza, catarrhal affections of the respiratory mucous membranes, and ulceration in various parts of the animal body. To enumerate all the cases recorded in the veterinary literature in which glanders is said or believed to have developed from other diseases, or been produced by an absorption of matter, would lead too far, for the same are very numerous. As to the different theories that have been advanced, I have to refer to what has been said in the first part of this treatise. To show, however, now easily mistakes may be made, I may be allowed to relate a case that occurred last summer in Chicago. Several horses, constituting the stock of a bankrupt circus, all animals in a very fine condition, were put up for keeping by the authorities in charge, in a certain livery and boarding stable. In the same stable influenza prevailed, and nearly every horse, excepting those circus-horses, became affected with influenza in its so-called catarrhal rheumatic form. Deaths did not occur, but some horses became affected severely. After the circus-horses had been in the livery-stable for several weeks they were sold by the United States marshal, and the day after the sale it was found that one of them, a fine black gelding, was affected with plainly developed nasal glanders, and had communicated the disease already to his stall-mate, which exhibited sufficient symptoms, a slight discharge from the right nostril and a characteristic swelling of the right submaxillary lymphatic gland, to warrant the diagnostication of glanders. After the discovery had been made, it leaked out that the black gelding had been "running from the nose" for over eight months. When the sale took place, some of the livery and boarding horses had not yet fully recovered from their influenza. Now, if one or more of the same should have become infected with glanders, and if the merely accidental discovery of the existence of that disease in one of the circus-horses had not been made, the cry would have been raised immediately that glanders had developed from influenza. Further comments, I think, are unnecessary. It may suffice to suggest that a great many apparent developments of glanders from other diseases may have taken place in a similar way. There also can be no doubt that a great many cases of occult glanders (so-called nasal gleet) have been looked upon and treated as distemper, catarrh, influenza, &c., and afterwards, when plain symptoms of glanders made their appearance, it was more convenient all around to suppose that glanders had pro-

ceeded from the disease first diagnosticated, than to admit a diagnostic mistake. So with farcy. It undoubtedly has happened a great many times that the first symptoms of farcy have been mistaken for an inflammation of the lymphatics, and as farcy in its further course becomes frequently complicated with glanders, it is easy to conclude that an inflammation of the lymphatics constitutes a primary disease of glanders. Under certain circumstances I admit it is rather difficult to discriminate at once an inflammation of the lymphatics and subsequent ulceration or formation of abscesses from genuine farcy, and so mistakes, undoubtedly, have occurred.

Besides all that the diseases looked upon as the possible progenitors of glanders are similar to the latter only in regard to a few external symptoms but entirely different as far as the morbid process is concerned. They lack altogether during their whole course, from first beginning to their final termination, the specific characteristics of glanders, and a conversion of any one of them into the latter disease must be looked upon as just as impossible as it is to change a cow to a horse, or a goat to a hog. Still, this does not exclude the possibility of an animal affected with one of those disorders, or with any other disease, becoming infected with glanders or farcy. On the contrary, a diseased condition of the respiratory mucous membranes seems to facilitate an infection if an exposure to glanders contagion is taking place. At any rate the morbid process of glanders is always much more violent and makes a more rapid progress in a diseased organism than in one that is otherwise perfectly healthy. To get at the bottom of the facts and to guard against mistakes, it will be necessary never to lose sight of the specific characteristics of the glanders process.

Notwithstanding all those cases of apparent deuteropathic development of glanders which can be found in the veterinary literature of nearly every country, I am not afraid to say I do not believe that a case of real deuteropathic glanders, one that can stand a thorough and unbiased investigation, has ever occurred. Gerlach, in his treatise, repeatedly mentioned, says, on page 115, "A genuine development (protopathic and deuteropathic) must be considered as not proved."

Glanders, as well as pleuro-pneumonia, Russian cattle-plague, and scab and mange, will cease to exist if a propagation by means of infection is made impossible. If, for instance, within the limits of the United States all animals affected with glanders were destroyed at once, and at the same time every place where glanders-contagion may be existing were thoroughly disinfected, and if any importation of glandered horses or of the contagion were successfully prohibited or prevented, glanders would at once become extinct, and would never make its appearance again within the limits of the United States, unless imported again from other countries. It is a disease that can be eradicated.

I said before that glanders is most frequent in those countries in which numerous horses are imported from other countries. This is an undeniable fact except in regard to those commonwealths in which good veterinary schools provide a sufficient number of thoroughly educated veterinary surgeons, and in which stringent laws enforce the immediate destruction of every animal affected with glanders, prohibit veterinary quackery, and do not allow anybody to keep or to treat a glandered animal unless he is a qualified veterinary surgeon, and gives sufficient bonds to pay possible damages.

I know very well that I shall be contradicted, but mere denials, or questions asking where glanders originally comes from, if a spontaneous development does not take place, will not do. Such questions, of

course, I cannot answer. When Gerlach first pronounced pleuro-pneumonia of cattle a pure contagion, that is, a disease propagated exclusively by means of infection, Professor Spinola asked pertly if Gerlach had imported pleuro-pneumonia from the moon, but failed utterly—and everybody else, too—to show a solitary case of an unmistakable and well-authenticated spontaneous development. If any one can show me a case of spontaneous glanders, not caused by infection, or give satisfactory and unmistakable proof that a protopathic or denteropathic development of glanders has occurred, I will take back what I have said, but not before.

The contagion.—The contagion must be considered as the exclusive cause of glanders. When I lived in Dixon, Lee county, Illinois, from the fall of 1865 to September, 1868, I had an opportunity of observing numerous cases of glanders. A friend of mine, D. W. McKinney, dealer in horses and proprietor of a livery-stable, knew nearly every horse in the whole county, and taking special interest in those cases of glanders, assisted me in inquiring into the history of every horse affected. As a result, every case, without exception, was traced back to an infection by condemned United States army horses that had been sold to the farmers.

The contagious principle is developed during the very first stages of the disease, and even before plain symptoms have made their appearance. It exists most concentrated in the immediate products of the morbid process, but especially in the discharges from the nose, and in the contents of the glanders and farcy ulcers. It is present also in all the secretions and excretions of the affected animals, as has been proved by numerous direct experiments. Professor Gerlach, in order to ascertain if the contagion is contained not only in the fluid animal humors and excretions, and in the fluid and solid products of the morbid process, but also in the pulmonic exhalation and in the perspiration, has made several interesting experiments, and has found that an inoculation of a healthy horse with artificially condensed exhalation and perspiration of a glandered animal produces the disease. He has, however, not succeeded in communicating glanders by injecting defibrinated blood of glandered horses (100 and 200 grains respectively) into the veins of healthy animals. Still, the contagiousness of the blood has been established long ago by Abildgardt and Viboe in Copenhagen.

The experiments of Gerlach and of others, and numerous clinical observations, too, have proved beyond a doubt that the contagion contained in the exhalation and perspiration clings, though only in small quantities, to the aqueous vapors exhaled by the respiratory organs and perspired by the skin. The contagious principle, therefore, is volatile only in a limited degree, and to produce an infection by means of the exhalation and perspiration at a distance of several feet requires usually some length of time. So it happens very often that a horse occupying with a glandered horse the same stable, but not the same stall, remains exempted. The more forcible and accelerated the breathing and the more abundant the perspiration of the horse affected with glanders, the greater, it seems, is the danger of an infection of healthy horses that are near, or occupy the same stable.

Another question not easily answered, and yet an object for investigation, may be asked; that is, Do organic forms constitute the contagion; is the contagious principle bound on, or inseparable from, organic forms; or is its action merely a chemical one? On this question the opinions of the best authorities differ. Professor Gerlach, in his successful experiments with condensed exhalation and perspiration, found no organic forms whatever in the perfectly limpid drops; further, he

found no organic forms in the very infectious caseous substances taken from the mucous membrane of a horse affected with diphtheritic glanders. He, therefore, has come to the conclusion that the glanders-contagion does not consist in, nor is bound on, organic forms, and that the action of the contagious principle must be a chemical one. On the other hand Hallier and others have found organic growth (micrococci) in the humors of glandered horses and in the products of the morbid process of glanders, and are inclined to consider those micrococci as the agency which causes the disease, produces the morbid changes, and effects a communication of the glandered process to other healthy animals. If Hallier and others are right, a great many mysterious phenomena observed in glanders find an explanation, but if Gerlach's observations are correct, Hallier's theories necessarily fall to the ground. Gerlach says: "Hallier finds everywhere fungi," and Chauveau finds everywhere cells. Still, notwithstanding my high regard for Gerlach and the thoroughness of his investigations, I think the finds of Hallier and of other investigators cannot be discarded; positive evidence is always of more value than negative proof. Haeckel (*History of Creation*, vol. 1, Protista.) and Klebs (*Archiv fuer experimental-Pathologie*, 1873), separate the microscopic organisms found in glanders and in other contagious diseases from the class "fungus," and consider them as a separate class, belonging neither to the animal nor to the vegetable kingdom. Whatever may be the truth as to the real nature of the contagious principle, future investigations must reveal. I myself have had no opportunity to make thorough microscopical investigations of the morbid products of glanders, and can, therefore, not advance any definite opinion of my own. Mere speculations cannot bring any facts to light; thorough and patient observations are necessary.

The glanders-contagion, whatever its nature may be, communicates glanders and farcy not only to the animals belonging to the genus equus, but also to other animals and to man. Numerous cases are reported every year in the periodical veterinary literature. The only domesticated animal that seems to be exempted or to be destitute of any predisposition is the ox.

Glandered horses, as soon as the disease has been diagnosticated, are usually removed to the cow-stable, or to pens or places where cattle are kept, and still no case, as far as I have been able to learn, is on record in which an ox or a cow has contracted the disease. Sheep are easily infected. Goats, too, possess sufficient predisposition. Ercolani described a case in "*Il medico veterinaria*," 1861, and Wirth succeeded in communicating glanders to a male goat by means of inoculation (*Archiv fuer Thierheilkunde*, Bd. 6, Heft 1, 1844). Hogs seem to possess but little predisposition, and cases of dogs becoming infected and dying of glanders have been communicated by Nordstroem (*Tidskrift for Veterinairer*, etc., 1862) and Langeron (*Revue vétérinaire*, etc., Toulouse, série I, 1876). Several cases are on record in which wild animals, lions especially, have become infected with glanders by being fed with meat of glandered horses. According to the experiments of Viborg and Bingheim, the flesh of a horse affected with glanders can be eaten without danger of infection if properly cooked or fried.

One important phenomenon must be mentioned, and that is, that glanders always becomes a frequent disease after any great war. Such was the case in our own country after the great civil war, as I have mentioned before, and also in Germany and France, but especially in the latter country, after the war of 1870-71. Cases of glanders will also be frequent during the next few years in the Turkish Empire, and in those

Turkish provinces which have become independent, when separated from the Ottoman territories. The cause of this frequency is an obvious one. It consists in the abundant opportunity of infection. One horse affected with (occult) glanders in either of the hostile armies can, for obvious reasons, communicate the disease with the greatest facility to a large number of animals. The fact of glanders becoming frequent after each large war has been used very frequently as an argument in favor of a protopathic development, but if it is looked upon in a proper light it proves, if anything, the exclusive spreading of the disease by means of the contagion.

Prevention and treatment.—As to a medical treatment, there is scarcely a remedy known in the whole *materia medica* that has not been used against glanders, but, so far at least, with very poor success. It is true a great many *pretended* cures are on record. But if the slow or chronic progress of the morbid process, its frequent remissions in warm and dry weather, exacerbations in rough, cold, and inclement weather and in a foul atmosphere, and the great confusion that has prevailed in regard to the true nature of glanders are taken into consideration, it is no wonder that mistakes and deceptions have occurred. Some of the cases that are said to have been cured have been no glanders at all, and in others the pretended cures have been only temporary—a mere remission. *Confirmed glanders must be considered as incurable*; and it would, therefore, be for the benefit of every one if our general government (Congress) would enact a law which should make it a criminal offense to keep and to use a horse, or any other animal, known to be affected with glanders. Any attempt to cure should also be strictly forbidden, because a prompt and immediate destruction of every animal affected with glanders, a disease which spreads only by means of its contagion, constitutes the best, surest, and cheapest, and in fact the only prevention.

A case of recent occurrence will serve to illustrate how glanders spreads, and how much cheaper it is to destroy a glandered horse at once than to permit the same to communicate the disease to healthy animals. It will also show the necessity of a stringent law making the sale of an animal known to be affected with a contagious disease a criminal offense.

Last fall Mr. George T. . . . , Pottawatomie county, Kansas, bought a horse of a Mr. Ch. . . , Manhattan, Riley county, Kansas, and pastured and stabled the same with his other horses, about twenty-four or twenty-five in number. The horse in question, when bought, had some discharge from the nose, which, of course, was pronounced to be nothing but the product of catarrh—in common parlance, a cold. In the course of the winter several of Mr. T. . . . 's horses commenced to have discharges from the nose. Mr. T. . . . became alarmed, and brought the new horse, whose nasal discharges had increased, and who showed other symptoms of disease, such as a staring coat, emaciation, &c., to me for examination. I found the symptoms to be those of an advanced stage of glanders. Subsequent inquiries revealed some of the previous history of the animal. Mr. Ch. . . had bought the horse from another man, whose name I do not remember, only a few days before he sold the same to Mr. T. . . . , and had kept the animal, while in his possession, strictly separated from his other horses, because he knew that the same had a chronic discharge from the nose, and had had it for about two years. Is not such a transaction criminal? And still, in the case mentioned, there is no redress to be had. Mr. T. . . . is a comparatively poor man; his farm is mortgaged, and all the property he may call his own consists in his stock, but especially in his horses. As I moved away from Kansas

early in the spring, I have not learned how many of his horses have become affected, but several had contracted the disease before I left. Besides that, his horses had been together quite often with those of his neighbors, on the prairie, before he knew them to be affected with glanders. It is possible that he has lost, or will lose, nearly every animal he has. Mr. Ch. . . does not own anything; all his property is in his wife's name; consequently Mr. T. . . ., if he sues for damages, will have to pay lawyers' fees and costs, but cannot recover anything. If there were a United States law which made it a criminal offense to sell animals affected with contagious diseases, or to own and to keep animals which exhibit symptoms of contagious diseases, and to neglect to advise the proper authorities of the fact, such cases as the one related would not occur. If Mr. T. . . . were not an honest man, he would undoubtedly have kept still, and would have sold his glandered horses to other innocent parties, and contributed in that way in spreading the disease. I could relate numerous similar cases, but think this one will suffice, especially as this article is already too long.

A successful prevention of glanders is possible only if the contagion—which, even if it should not constitute the sole and only cause of the disease, causes at least nine hundred and ninety-nine cases of one thousand—is thoroughly destroyed wherever it may exist or wherever it may be found. Consequently every animal affected with glanders should be killed as soon as the nature of the disease becomes known, and be buried sufficiently deep or be cremated. But as the contagion adheres frequently also to the stables—manger, floor, partition, &c.—that have been occupied, the stable utensils—brush, curry-comb, &c., and the harness, blankets, halters, bridles, saddles, &c.—that have been used or been in contact with glandered horses, it is of great importance to know what will best and most effectually destroy the contagion. Professor Gerlach has made very interesting and valuable experiments, to relate which, however, would lead too far. I will therefore only state the results arrived at. The discharges from the nose, glanders-matter, &c., lose their infectiousness if perfectly dried by being exposed to currents of air or to the rays of the sun; but kept moist, for instance in a damp cellar, wrapped up in a moist rag, or adhering to the corners of the manger, to a damp wall or floor, or to the bedding or the manure, &c., the contagion seems to possess great vitality, and may remain effective for half a year or longer. Putrefaction does not destroy the contagious principle. Chlorine destroys the contagion, and is therefore a very efficient disinfectant, provided the chlorides used come in actual contact with the contagion. A brief exposure of the infectious substances, nasal discharges, glanders-matter, &c., to the influence of chlorine in a gaseous state, mixed with the atmosphere, is ineffective. As a remedy to be given internally, chlorine, in shape of chlorine-water, for obvious reasons cannot be used; chemical combinations will be effected before an absorption can take place. The best and surest destroyer of the glanders-contagion is carbolic acid. It may be used not only as a disinfectant or for the purpose of destroying the contagion clinging to the wood-work of the stable &c., but also in incipient cases of farcy, and in cases in which an infection with glanders-matter has just taken place in a wound, for instance, as a local remedy. If applied to the glanders-ulcers on the septum, or to farcy-ulcers, a tendency to heal will make its appearance. As a disinfectant, a solution of carbolic acid in glycerine or alcohol and water (1:1 or 2:20) is perfectly strong enough to be effective. Old straw, hay, and bedding must be burned, and blankets, &c., are best disinfected

by exposing the same for some time to a temperature of 212° F., or higher, either in an oven or in boiling hot water.

As to a therapeutic treatment only a few words will be necessary. Some of the most heroic medicines have been used with very doubtful results. So, for instance, Professor Ercolani, in Turin, claims to have had good success with arsenate of strychnine, but others who have made the same experiments have had no success whatever. Lacaze (*Revue Vétér.*, &c., Toulouse, 1876), asserts to have been successful with large doses of alcohol, but he discriminates contagious and noncontagious glanders, and so no comment will be necessary. In former times cantharides were considered as a remedy, but later investigations have proved them to be perfectly worthless. That every kind of mercurial combination and a great many sure-cure nostrums have been used and been advertised as specific remedies, as in every other incurable disease, is too self-evident to need any further mentioning.

The only rational treatment of a horse or other animal affected with glanders consists in a proper and effective application, in the right place, of either half an ounce of lead or five inches of steel; and until such treatment is invariably adopted, or made compulsory, there will be no prospect whatever of freeing this country from this loathsome disease, dangerous even to man, in whom, if once infected, it is just as incurable as in horses.



INDEX.

	Page.
Alabama, diseases of farm animals in	186, 211
Appropriations for investigating diseases of farm animals	5, 220
Arkansas, diseases of farm animals in	187, 213
Autopsies in swine disease	31, 33, 49, 55, 59, 103, 128, 142, 174, 184
<i>Bacillus suis</i>	10, 11, 13, 41, 42, 43, 44, 45, 53
Berkshires and their crosses peculiarly liable to disease	178
British Government rules for treating pleuro-pneumonia and rinderpest	251
British orders in council concerning cattle imports	227
California, diseases of farm animals in	187
Cattle export trade, British orders in council	227
Chicago stock-yards full of diseased animals	164
Colorado, diseases of farm animals in	188
Commissioner's letter to Hon. A. S. Paddock on pleuro-pneumonia	219
Commission to investigate diseases of farm animals in	5
Congressional action necessary to arrest cattle disease	221
Contagion in swine disease	9, 39, 165
glanders	268, 273, 284
<i>Cysticercus cellulosa</i>	66
<i>C. Zemicollis</i>	66
Dakota, disease of farm animals in	188
Deaths of swine, number and percentage of	124
Delaware, diseases of farm animals in	188
Detmers, Dr. J. H., paper on glanders	257
Different breeds of hogs as affected by the disease	120
Diphtheria in hogs	143
predisposing causes	144
Diseased hogs butchered and packed for market	164
Diseases retarded by extreme cold	6
Disinfectants in hog disease	164
Examiners appointed	5
Experiments in hog disease	19, 33, 49, 56, 66, 75, 98, 103
Farcy, common (subcutaneous glanders)	262
or external glanders	262
skin (exanthematous glanders)	263
in the human system	263
Farm animals, diseases of, in the different States	186
total losses by disease	5
Florida, diseases of farm animals in	188, 214
Germs, morbid, in hog diseases	10, 41, 42, 44, 53, 63, 64, 65, 66, 158, 185
<i>Aecaris lumbricoides</i>	185
<i>Bacillus suis</i>	10, 41, 42, 44, 53
<i>Cysticercus cellulosa</i>	66
<i>C. Zemicollis</i>	66
<i>Sclerostomum dentatum</i>	65
<i>Strongylus elongatus</i>	63
<i>Tricocephalus dispar</i>	64
Georgia, diseases of farm animals in	189
Glanders, anatomical changes	274
catarrh	278
causes and origin	280
cells, developed from epithelium cells	270
connective tissue corpuscles	270
in the mucous membrane	278
chronic and acute	264
contagion	284
definition	257
external, or farcy	262
literature of	269
morbid process in	269
nasal	267
prevention of	286

	Page
Glanders, symptoms.....	260, 264
post-mortem indications.....	261
pulmonal.....	260
treatment of.....	266
ulcers.....	279
Hog-cholera a misnomer; should be classed with exanthemata.....	165
definition.....	136
has all the characters of gastro-enteric fever in man.....	186
Hog disease, action of Congress invoked.....	164
affecting different breeds of hogs.....	120
other animals.....	9, 14, 15, 100, 101, 102
blood-poisoning.....	184
can it be effectually quarantined?.....	163
causes.....	39, 42, 70, 136, 166, 175, 178
hogs eating grain left by fattening cattle.....	178
too close breeding.....	178
character.....	180
cleanliness.....	118
climate and food, influence of.....	158
clinical observations.....	54
cohabitation of healthy hogs with sick ones.....	99
communicated by passing car and wagon loads of infected hogs.....	156
contagion.....	9, 39, 99, 139, 165
description.....	20
destruction in many cases the only remedy.....	139
diagnosis.....	116
difficulties of quarantining.....	164
disinfectants.....	164
duration.....	8, 115
effectiveness of dried and frozen virus.....	6, 13, 16, 98, 99
etiology.....	170
experiments.....	19, 33, 49, 56, 66, 75, 98, 103
food, effect of.....	117, 158
incubation.....	57
infection of a pig with virus from a sheep.....	101
in Illinois.....	19, 156
Indiana.....	112
Iowa.....	135
Missouri.....	173
Nebraska.....	177
North Carolina.....	123
Virginia.....	165, 167
largely preventable by hygienic measures.....	173
majority of cases under 12 months of age.....	166
malaria.....	172
modes of attack, first mode.....	179
second mode.....	180
morbific germs.....	10, 41, 42, 44, 53, 64, 65, 66, 153
more fatal in summer and fall.....	6
measures of arrest and extirpation.....	71, 139, 181
prevention.....	45, 121, 132, 171, 181
microscopic observations.....	61
morbid process.....	7, 26, 39, 43
mycetic theory.....	158
nature of the disease.....	42, 69, 127
infectious principle.....	42
occult forms.....	99
pathological conditions.....	115, 173
per cent. of fatal cases.....	186
policy of remedial treatment.....	71
post-mortem indications.....	31, 33, 49, 55, 59, 103, 128, 142, 160, 170, 174, 184
prevalence.....	113
prognosis and termination.....	25
propagation through inhalation doubtful.....	40
recurrence of attack.....	120
sanitary regulations.....	133
symptoms.....	7, 8, 20, 22, 57, 69, 114, 126, 160, 169, 173, 179
synonyms.....	19
treatment.....	48, 52, 122, 169, 172, 176, 181

	Page.
Hog disease, tumors	11, 44
typhoid character	173
visits to herds infected	161
virus, dried or frozen, effectiveness of	6, 13, 16, 98, 99
water, influence of	117
Hogs in health, treatment, food, and quarters	178
losses from disease	5, 124
Idaho, diseases of farm animals in	190
Illinois, diseases of farm animals in	190, 216
swine in	19, 156
Indiana, diseases of farm animals in	192
swine in	112
Indian Territory, diseases of farm animals in	193
Iowa, diseases of farm animals in	193, 218
swine in	135
Jersey City stock-yards, pleuro-pneumonia reported in	240
Kansas, diseases of farm animals in	195
Kentucky, diseases of farm animals in	195
Letter of Commissioner to Hon. A. S. Paddock, on pleuro-pneumonia	219
Losses of farm animals by disease	5
swine by disease	5
Louisiana, diseases of farm animals in	196
Maine, diseases of farm animals in	197
Malaria in hog disease	172
Maryland, diseases of farm animals in	197
Massachusetts, legislation on pleuro-pneumonia	246
Michigan, diseases of farm animals in	197
Minnesota, diseases of farm animals in	198
Mississippi, diseases of farm animals in	198
Missouri, diseases of farm animals in	199
swine in	173
Montana, scab in sheep	201
Mycetic theory of swine disease	158
Nasal gleet,	263
Nebraska, diseases of farm animals in	201
swine in	177
Nevada, diseases of farm animals in	202
New Jersey, diseases of farm animals in	202, 220, 240
New Mexico, diseases of farm animals in	202
New York, diseases of farm animals in	202
City, pleuro-pneumonia in	237, 240
stock-yards	240
legislation on pleuro-pneumonia	249
North Carolina, a strange cattle disease in	253
diseases of farm animals in	202
swine in	123
losses of swine in	124
Ohio, diseases of farm animals in	204
Oregon, diseases of farm animals in	205
Other animals infected by hog disease	9, 14, 15, 100, 156
Pennsylvania, diseases of farm animals in	205
Pleuro-pneumonia, affected animals should be promptly killed	239
in and around New York City	237, 240
certificates of soundness absurd	241
circular of the Secretary of the Treasury	226
contagion	234
correspondence of Commissioner with Secretary of the Treasury	225
danger of infecting our unfenced stock-ranges	229, 238
inoculation	238
trying to cure infected animals	239
English "contagious diseases" act	232
gradual extension westward	228
history, nature, symptoms, and treatment	242
imported into England in 1842	228
United States in 1843	228
in Canada	223
Massachusetts, legislation	246
New Jersey	220, 221, 240

	Page.
Pleuro-pneumonia in New York, governor's instructions	236
legislation	237, 249
letter of Professor Gadsden	222
the Northwest	224
Virginia	220
letter of President Liautard	223
Professor Billings	222
Professor Law	226
may be carried West by blooded cattle	229
measures for its extinction	230, 239
must be stamped out	235
post-mortem indications	214
Professor Law's review of the disease	231
rapid spread of the malady	234
rules of the British Government against	251
sale of infected animals	228
the general government must act	239
the great danger of our stock interests	227
vitality of the virus	229
Quarantining against hog diseases, difficulties of	164
Rinderpest, British Government rules against	164
letter to the Commissioner from Professor Gadsden	255
<i>Sclerostomum dentatum</i>	65
Secretary of the Treasury, correspondence of Commissioner with	225
circular of	226
Selling diseased animals	156, 228
Sheep disease in Montana	201
Washington	210
South Carolina, diseases of farm animals in	205, 218
<i>Strongylus elongatus</i>	63
Tennessee, diseases of farm animals in	206
Texas, diseases of farm animals in	207
<i>Tricocephalus dispai</i>	64
Typhoid fever in hogs, definition	140
morbid anatomy	142
symptoms	141
Typhus fever in hogs, cause	140
definition	138
duration	139
incubation	140
pathological lesions	139
symptoms	138
treatment	153
Utah, diseases of farm animals in	208
Vermont, diseases of farm animals in	208
Virginia, diseases of farm animals in	209, 219, 220
swine in	165, 167
Virus, continued vitality of virulent products of swine disease. 13, 16, 66, 98, 99, 101, 158,	229
easy destruction of swine infection by putrefaction	67
Washington Territory, diseases of farm animals in	210
West Virginia, diseases of farm animals in	210
Wisconsin, diseases of farm animals in	211
Wyoming, diseases of farm animals in	211

DEPARTMENT OF AGRICULTURE.

SPECIAL REPORT—No. 13.

REPORT

UPON THE

CONDITION OF CROPS

AND

LIVE STOCK,

APRIL, 1879.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1879.

CONDITION OF CROPS.

WINTER GRAIN.

WHEAT.

AREA.—Two investigations of the growing crops were made by the Department in two series of circular inquiries to correspondents, one of which was returnable December 1 and the other April 1. A careful study of these returns indicates that the acreage of winter wheat now growing is about $1\frac{1}{2}$ per cent. greater than last year. In the Southwest, and especially in Texas, the area has been reduced since sowing. Unfavorable growing conditions, especially drought, have caused many wheat fields to be plowed up for cotton or other crops. The Atlantic coast States, from Maine to Georgia, as a whole, show a declining area, though some of the smaller ones have increased. Of the other Southern States only Mississippi reports a diminished area. Of the Northern and Western States, Michigan, Minnesota, and Kansas fall off from last year; the other great wheat-growing States increase. On the Pacific coast, Oregon shows a very great enlargement. California is not included in the estimates of winter-wheat area.

In the West and Northwest it is evident that the increase in winter wheat area is largely due to the transfer of wheat-growing enterprise from spring to fall sowing. The crop of 1879, then, will show a still greater preponderance in winter-sown grain. Unless spring sowing should manifest an unexpected increase, the total wheat area of 1879 promises to be smaller than its predecessor. But in this connection it should be remembered that the public domain is receiving settlement at a rate unprecedented in our history. The amount of wheat area inaccessible to statistics, already sufficiently puzzling, will be a larger element in the calculation than in any previous crop.

CONDITION.—The crop of the country, taken as a whole, presents a promise at least 2 per cent. below average. The New England States reach a full average. In the Middle States conditions of growth were very unfavorable; fall drought prevented the seed from obtaining an early start. Very little or no injury from freezing is reported in this section where the crop was protected by snow. Here also the drill is in very extensive use, and drilled wheat is far less liable to winter injuries than the broadcast.

Further south, in the Atlantic coast States, injuries from freezing are more generally noted, and the lack of protecting snow. Several correspondents in

this region report the coldest winter on record in their localities. South of Maryland the use of the drill is quite limited, and the broadcast fields were but ill prepared to resist the unusual strain of frost. In the more southern portions complaints of rust are heard. Some unsatisfactory experiments of wheat culture on tide lands and on sandy uplands of South Carolina near the sea are reported. In this State the Missouri yellow wheat, received from the Department, headed out in March, a thing unprecedented even in that southern climate. Georgia alone of this section reports a condition above average.

In all of the Gulf States and Southern inland States drought and cold were especially severe upon the broadcast fields of this region. Kentucky and West Virginia appear to have had more snow than usual, and hence their fields suffered less from the unusually low temperatures.

North of the Ohio there are more complaints of injuries from freezing in Michigan than in the other States of this region where the snow was more general. Wisconsin reports a very remarkable increase in her acreage and a high condition of the crop. This great wheat region now promises a very large and fine yield. Around La Crosse, Wis., the Odessa variety has shown great vitality in meeting the demands of the climate, and is showing up remarkably well.

West of the Mississippi the small crops of winter wheat in Minnesota and Nebraska are not remarkably promising. Kansas and Missouri are also below average; but Iowa, with a largely increased acreage, presents a very promising condition. Saunders, Nebraska, reports that no fields planted after August have stood the severity of the winter. In many counties the preservation of the crop is ascribed to snow, and in many others its loss or injury is ascribed to its absence. Kansas and Missouri complain of droughts. Reno County, Kansas, in the Arkansas Valley, had hundreds of acres destroyed by grasshoppers last fall, and was troubled over rumors of a new species of army worm.

The reports from the Pacific coast indicate a high condition of the growing crop generally.

Three or four counties in our entire wheat region note the presence of the Hessian fly, but damages so far are quite inconsiderable.

RYE.

ACREAGE.—The area in rye has fallen off about 4 per cent. from last year; the range is from 90 per cent. in Maryland to 125 in Oregon. Vermont, Massachusetts, Rhode Island, New Jersey, Pennsylvania, South Carolina, Florida, Alabama, Michigan, and Minnesota have increased their acreage; the other States have decreased.

CONDITION.—This crop very closely follows the condition of the wheat crop in different sections, showing the operation of more general negative causes than of those specifically influencing the crop. Taken as a whole it is 4 per cent. below average. It is about average in New England, and in nearly all the West and Northwest; on the Pacific coast it is above; in the other States it has fallen off.

NOTES OF CORRESPONDENCE.

NEW YORK.—*Erie*: Injured by severe cold, but may recover.

NEW JERSEY.—*Salem*: Condition remarkably poor, owing to continued drought during early fall; not more than $\frac{1}{4}$ of an inch of rainfall.

PENNSYLVANIA.—*Armstrong*: Came up badly, owing to drought, and was eaten by the fly; prospect unfavorable for a good crop. *Cambria*: Not looking as well as last year, and three weeks late, on account of continued snows. *Clinton*: Owing to dry fall and backward spring the crop is not looking well. *York*: Looking remarkably well; color good, and fine prospects for a large crop. *Beaver*: Not looking as well as last year. *Mercer*: From present appearances there will be about half a crop. *Northumberland*: The stand is thin and looks unpromising. *Adams*: Backward, and indications unfavorable.

MARYLAND.—*Caroline*: Acreage greater than last year, but the crop has been damaged at east 10 per cent. by severe weather. *Charles*: Severe winter, and grain promised badly; has now improved and prospects are more hopeful. *Queen Anne*: Backward, but stands well; prospects good. *Baltimore*: Looking bad. *Montgomery*: Winter favorable, but wheat backward; 20,000 acres in wheat, mostly drilled. *Talbot*: Thrown out to a considerable extent by frost. *Prince George's*: Winter hard on grain. *Worcester*: Very little snow during the winter, but the cold weather has been uniform, which has been favorable to wheat; very little thrown out.

VIRGINIA.—*Campbell*: Presents a bad prospect. *Caroline*: Less promising in appearance than for ten years past, the effect of very cold weather, with but little snow. *Gloucester*: Unpromising in some portions of the county, but unusually fine in others; some report condition 120. *Greene*: An equal area sown, but severe winter has injured prospects for an average crop. *Warwick*: Has been looking badly, but is now improving. *Amelia*: Not the usual area sown; winter unfavorable. *Dinwiddie*: Sown late, but looks well generally. *Henrico*: Winter severe; dry, wet, and cold, and no snow; grain of all kinds promise well. *Rockingham*: Very much killed by severe winter; early sown shows no signs of the fly. *Bedford*: Coldest winter for years; wheat looks unpromising. *Roanoke*: Condition of wheat not good, owing to the long, cold winter. *Northampton*: Smaller area than has been for some years; will be a very short crop. *Craig*: Seriously affected by the severity of the winter. *Wise*: In very good condition.

NORTH CAROLINA.—*Alleghany*: Greatly damaged by cold weather; bad prospect. *Davidson*: Suffered from severe cold. *Stanley*: Condition of the general crop is promising. *Jackson*: A good stand and present indications excellent.

SOUTH CAROLINA.—*Abbeville*: Backward, but looking healthy; weather favorable. *York*: The area sown is not so great as last year, owing to wet weather at time of seeding. *Georgetown*: Signs of rust; crop a failure. Unsatisfactory experiments have been made for twenty years on tide lands, as well as on sandy uplands skirting the sea-coast. *Lexington*: Wheat has improved during the past month. The Missouri yellow wheat obtained from the Department and sown last October is heading; never before saw wheat heading in March. *Spartanburg*: March has been favorable, and there is a good stand.

GEORGIA.—*Gordon*: Has a good stand, but is very small for the season. *Lincoln*: Has not looked better for years.

ALABAMA.—*Calhoun*: Backward, but good average stand, and indications favorable for good crop.

TEXAS.—*Comal*: Condition hopeless. *Williamson*: In a very unpromising condition, caused by drought. *Bell*: The long dry weather has cut crop prospects down nearly one-half. *Bexar*: Past redemption on account of dry weather; some farmers plowing up grain to plant cotton should we have rains; not moisture enough in the soil at present to sprout the seed; some families have to haul water six miles. *Burleson*: Finest prospects for crops we have ever had. Corn knee-high and healthy. *Mason*: Wheat has suffered for want of rain; twice as much planted as last year. *Nacogdoches*: Need rain; have not had rain since February 26. *Wood*: Not much sown owing to the dry fall.

ARKANSAS.—*Craighead*: Present indications favorable for good crop. Decrease of area

in consequence of failure last year. *Franklin*: Affected by cold; indications not good. *Garland*: Severe cold of past few weeks has injured crop at least 20 per cent., bringing it below an average.

TENNESSEE.—*Greene*: Is beginning to acquire a good color, and looking well. *Bradley*: Present appearance indicates about 110. *Haywood*: Decreased acreage in consequence of the failure of last year's crop. *Henry*: Broadcast wheat very unpromising, but drilled is fully up to an average; the latter represents about one-fourth of the crop. *Knox*: Backward, which is rather a favorable indication of a good crop.

WEST VIRGINIA.—*Pleasants*: In very good condition on rich soil, but poor on thin hill land. *Braxton*: More sown last fall than previously; got a good start, was covered with snow most of the winter, and is now looking fine. The largest and best field of wheat grown in this county in the past thirty-one years originated from one quart of Fultz wheat distributed by the Department. *Tyler*: About two thousand acres sown and looks well. *Roane*: Does not look as forward as it did this time last year. *Wood*: Somewhat injured by freezing.

KENTUCKY.—*Nicholas*: Covered with snow during the cold freezing weather, and hence looks fine.

OHIO.—*Vinton*: The abundant snows have kept the wheat and rye from winter-killing; prospects very favorable. *Wyandot*: Looking well; average will be about 95. *Miami*: Never better at this time of the year. *Paulding*: Looks as well as it did last spring, but not as forward. *Erie*: Wet weather prevented it being sown as early as usual; got but little growth before freezing weather and does not look very promising this spring. *Union*: Looks well, but not yet out of danger. *Summit*: Prospect not very encouraging, very small and backward; some pieces have been injured by the fly.

MICHIGAN.—*Livingston*: Suffering badly from freezing and thawing; will be materially injured unless the weather becomes settled. *Menominee*: But a limited acreage sown last fall; is looking well this spring. *Saint Clair*: A larger area sown last fall than in any previous year, but not looking very well. *Eaton*: Not favorable for a large crop; the Hessian fly destroyed some fields entirely. *Newaygo*: Decidedly poor; it got but little growth last fall, and was injured by the freezing weather of March. *Saint Joseph*: Damaged badly by the Hessian fly. *Cheyboygan*: Prospects very good.

INDIANA.—*Morgan*: Better than usual. *Steuben*: Looks well; acreage about the same as last year. *Madison*: Looking well and gives promise of an abundant harvest. *Huntington*: Does not look as well as last spring; owing to the dry fall it did not get a sufficient start. *Dubois*: Very good all over the county; was not frozen out much during the winter. *Jennings*: Looks well. *Harrison*: Looks unusually well. *Whitley*: A fine prospect; a large amount sown last fall; got a good start and wintered well. *Clinton*: The area of wheat is larger than last year and is looking well. *Floyd*: Very fine; prospects good for an abundant harvest. *Tippecanoe*: The oldest inhabitant says wheat never looked so promising. *De Kalb*: Looking well; heavy crop anticipated. *Franklin*: Never had a better prospect.

ILLINOIS.—*Adams*: Winter has been the most favorable ever known for wheat; best of prospects for a heavy crop. *Alexander*: Have had a favorable winter and wheat is looking well. *Christian*: Looks well, never better. *Clark*: Looks splendid; is not so large as at this time last year, but is quite above an average. *Carroll*: Looks well. *De Kalb*: Has wintered exceedingly well; no traces of winter-kill or ravages from insects. *Edwards*: Looks well. *Fulton*: Fine condition. *Hamilton*: The snows of the past winter have left the wheat in fine condition. *Greene*: Has not looked more promising for the past thirty years. *Jefferson*: Much better than last year; looks green and strong. *Jersey*: Remarkably well, except on high lands where it was somewhat injured by exposure. *Livingston*: Looks well. *Morgan*: Never looked better. *Mason*: Never looked better. *Ogle*: Looking well; the Silver Chaff is especially promising, having stood the winter without freezing. *Wayne*: Does not look as vigorous as last year. *Winnebago*: Looking fine.

WISCONSIN.—*Iowa*: Looking well. *La Crosse*: The Odessa was extensively sown last fall, having lived through the past three winters, and is now looking very well. *Winnebago*: Prospects good. *Walworth*: The area of winter wheat is greater than sown for years, and is in good condition. *Crawford*: Doing well, but does not look as well as it did last year.

MINNESOTA.—*Sherburne*: The open winter has been severe on winter grain. Too early to give estimate of damage.

IOWA.—*Henry*: Looks unusually fine. *Johnson*: Farmers have been experimenting with the Odessa for a winter wheat; a good many acres sown last fall and looks promising. *Jackson*: Area has been largely increased and the prospects are cheering. *Jefferson*: Never saw a finer prospect.

MISSOURI.—*Boone*: Wheat suffered but little from freezing; good prospects for an abundant crop. *Buchanan*: Wheat materially injured by drought. *Crawford*: Never looked as well as it does this spring. *Carroll*: Suffering for rain. *Cape Girardeau*: Looking well. *Dunklin*: Good average condition. *Daviess*: Looks fair, but needs rain badly; looked remarkably good just after the snow left, but was somewhat injured by cold afterward. *Dallas*: Wheat suffering for rain. *Greene*: Wheat came through the winter in fine condition, but is suffering for rain. *Gasconade*: Never saw wheat in better condition. *Gentry*: Not looking well; was injured by a cold snap in March. *Jefferson*: Wheat is somewhat injured by cold weather in March after the snow left. *Lincoln*: Looked vigorous up to middle of March, but the dry, cold weather since that time has injured it. *Macon*: Winter wheat looking well. *Maries*: Condition never better, but needs rain badly. *Platte*: No rain for several months; the high winds and cold weather are proving disastrous to wheat. *Pulaski*: Needs rain badly. *Ray*: Winter wheat has suffered from high winds and drought. *Saint Louis*: Winter wheat looks unusually strong and vigorous.

KANSAS.—*Chase*: Wheat looks fair, but needs rain. *Cloud*: Wheat needs rain very badly. *Douglas*: Suffering for rain. *Franklin*: Suffering for rain. *Jefferson*: Wintered well, but needs rain badly. *Linn*: Stood the winter remarkably well, but now needs rain. *Miami*: Wheat some injured by the Hessian fly and is suffering badly from drought; but little rain since last September. *Osage*: Wheat injured by dry weather. *Reno*: Hundreds of acres destroyed in fall by grasshoppers. The "Odessa" is about all dead, except that sown in February and March, which bids fair to make a good crop. Fall wheat on uplands appears to be dying for want of rain. Some scare about a species of the army worm. *Saline*: On account of dry weather wheat is fifty per cent. below average; some of it not up yet.

NEBRASKA.—*Saunders*: No wheat sown after August has lived through the winter; that sown later, if it came up, perished. *York*: No rain since August; winter wheat just coming up.

OREGON.—*Lane*: What winter wheat was sown is looking fine.

CALIFORNIA.—*Contra Costa*: Remarkably thrifty. *Placer*: Have not had a more flattering prospect since 1860. *Shasta*: Indications are that last year's crop will be doubled. *Sonoma*: Promise of best harvest for years.

DAKOTA.—*Lincoln*: Wheat and rye have not done well on account of dry weather.

Comparative area and condition of winter grain, April 1, 1879.

States.	Winter wheat.		Winter rye.	
	Area.	Condi- tion.	Area.	Condi- tion.
Maine.....	101	100	97	100
New Hampshire.....	101	100	90	100
Vermont.....	103	101	108	100
Massachusetts.....	105	100	106	100
Rhode Island.....	.....	.....	105	75
Connecticut.....	103	93	97	100
New York.....	97	96	96	96
New Jersey.....	87	88	103	96
Pennsylvania.....	99	94	101	95
Delaware.....	97	90	97	92
Maryland.....	99	80	80	86
Virginia.....	93	85	92	85
North Carolina.....	99	92	97	94
South Carolina.....	102	96	108	97
Georgia.....	102	101	98	98
Florida.....	.....	.....	115	110
Alabama.....	104	96	104	98

Comparative area and condition of winter grain, April 1, 1879—Continued.

States.	Winter wheat.		Winter rye.	
	Area.	Condi- tion.	Area.	Condi- tion.
Mississippi	92	94	95	98
Louisiana	105	93	89	86
Texas	101	89	89	94
Arkansas	100	97	81	92
Tennessee	100	89	81	96
West Virginia	103	96	94	98
Kentucky	104	99	90	100
Ohio	102	101	95	97
Michigan	98	99	100	101
Indiana	104	104	96	104
Illinois	107	101	97	100
Wisconsin	123	92	120	91
Minnesota	99	106	90	102
Iowa	113	99	97	100
Missouri	104	99	97	91
Kansas	95	94	87	91
Nebraska	109	94	97	102
Oregon	150	103	125	102

LIVE STOCK.

HORSES.

Our April reports show that live stock, generally, came out of winter quarters in a remarkably fair condition, considering the severity of the winter. Horses, especially, are in unusually good health and plight. The great majority of counties rejoice in the entire absence of all classes of maladies, and of those reporting forms of diseases a very large number state that the infection is not at all severe, and generally confined to very limited localities.

In New England, horses, as well as other kinds of farm animals, receive very careful treatment, including a judicious diet and ample shelter from the severity of the weather. Thus the leading predisposing causes of disease are avoided, and hence the immunity of this region from horse maladies is not at all surprising. Two or three of our correspondents note the presence of epizootic influenza, or of the old distemper in a mild form. Another notes a few cases of colic. With these exceptions the condition of New England horses is very good.

The Middle States present a larger proportion of counties reporting horse diseases than New England, but the aggregate is by no means formidable. Several kinds of diseases of the breathing apparatus, such as distemper, epizootic influenza, lung fever, putrid sore throat, &c., were more or less fatal in scattered localities, but generally they were of a mild type. A correspondent in New York notes an "eye distemper," which readily yielded to applications of tincture of arnica. Of brain diseases two counties in New Jersey report the "blind staggers," which, in some cases, was mistaken for lung fever. Our correspondent in Salem says that it is confined principally to low, foggy localities. A more serious type of brain disease, spinal meningitis, is noted in Richmond, New York, and Somerset, New Jersey; in the former county, cases mostly terminated fatally. The State of Delaware shows a very agreeable

absence of all forms of disease in all her counties. The cases of disease mentioned in this section affect but a very small proportion of the horses.

In the South Atlantic States the range of reported diseases enlarges in passing down the coast. While in Maryland only a fifth of the counties reporting note any form of disease, fully a third of those of Georgia report more or less of maladies. Of lung diseases, a few counties note epizootic influenza, old distemper, pneumonia, glanders, &c. Brain diseases, mostly in the form of blind staggers, are more general. This results from a congestion of the brain, passing more or less rapidly into inflammation. Our correspondent in Iredell states that an animal attacked with this disease becomes totally blind in from 12 to 24 hours; has high fever for several days, after which, if proper care has been exercised and the disease takes a favorable turn, the sight returns. Several correspondents in this region attribute this malady to the eating of unsound corn, especially that which has been injured on the stalk by river freshets. Copious bleeding is recommended. One correspondent in Georgia notices the presence of spinal meningitis. Of diseases of the digestive system, a few counties mention colic, scours, bots, &c. Of cutaneous diseases, three or four counties mention the "grub." It is characterized by small hard lumps beneath the skin, which result from the swelling of glands at the roots of the hair. One county in Virginia reports the "sore tongue." The diseases noted in this section of the Union appear to be of a more virulent type than in the States farther north, but they prevailed to a much smaller extent.

In the Gulf States, lung diseases bear a very small proportion to the general mass of maladies. The extremes of temperature which produce these diseases are mostly unknown in Southern climates, and hence, though horses are more exposed to the vicissitudes of the weather, they are less affected in their breathing apparatus. The brain diseases of the Atlantic coast States, especially the blind staggers, become more common, and are mostly attributed to the same causes—spoiled grain. Our correspondent in Santa Rosa, Fla., recommends large doses of sulphate of quinine, which, if given in time, will allay the severity of the symptoms. Another correspondent in the same State recommends calomel, followed by brisk purgative medicines. Winston, Ala., reports a heavy mortality from this disease; 2 per cent. of all the horses die between November and March. A Mississippi correspondent directly charges maladies of this character upon the neglect and ill treatment by owners. "Poverty is the foundation of nearly all horse ailments in the South." Our correspondent in Suwannee, Fla., "never knew a case of the blind staggers in a horse that had been liberally fed upon oats." One correspondent in Alabama notes the farcy, a malignant disease closely related to glanders. In Mississippi and Louisiana several counties report the presence of the "charbon," a disease which indicates bad treatment. It generally springs from imperfect ventilation or drainage. The absorption of the products of decaying vegetation by the lungs, and especially by the blood, impairs the vital qualities of the latter and softens the texture of the veins, so that the blood itself flows into the surrounding tissues, creating dark spots upon the skin. It is most liable to attack older horses or those with vital energies impaired by abuse. In several localities in Louisiana

very few animals survived the attack. Of stomach diseases, the colic and the bots are noted but in a small number of counties. A sort of rheumatic paralysis, for which no name has been found, is reported in Sharkey, Miss.; about fifty cases had occurred, but only three or four fatal. Cutaneous diseases—grub, scratches, &c.—had a narrow range. In Florida, a peculiar disease is noted under the name of “sanded.” It results from grazing upon short grass, upon which, through the agency of wind and rain, sand had heavily settled. This sand so clogs and constipates the bowels that the most powerful purgatives fail to remove it. Our correspondent in Columbus, Fla., states that horses coming from higher latitudes are especially liable to this disorder, and large numbers die in becoming acclimated. The mortality among Northern and Western horses is so great that native breeds command from 30 to 40 per cent. higher prices. The usual complaint of “buffalo gnats” comes but from one county—Yazoo, Mississippi—this year. This section of the Union presents the most virulent forms of horse diseases; yet what have been reported indicate but a small range of morbid conditions and a generally high state of health.

The Southern inland States show a tendency to the lung diseases prevalent farther north. Epizootic, influenza, and distemper become more frequent. Stomachic diseases, such as bots, colic, &c., become of more frequent notice. Quite a number of counties in Arkansas and Tennessee report the blind staggers. In Campbell County, Tennessee, 75 horses died, about 90 per cent. of those attacked. In other counties the disease was characterized by peculiar virulence. Our correspondent in Meigs, Tenn., advises free bleeding and purging, with inhalation of strong tobacco smoke till the nostrils begin to discharge copiously. The virulent matter gathered in the head will gradually be discharged by the quickened activity of the nasal ducts. In West Virginia and Kentucky the diseases were mostly such as affect the breathing apparatus, and of a very mild type; a few cases of pneumonia and glanders showed a more virulent action of disease. One county in Tennessee reports deaths from lockjaw.

In the States north of the Ohio River lung diseases are the most important. The old distemper and the epizootic influenza form the staple of these maladies. Chippewa, Wis., reports a new type of the epizootic influenza with many fatal cases. The forms of this disease, however, are generally very mild. Pneumonia is also noted, and in one instance a severe type of pleuro-pneumonia, in the southeast part of Clark County, Ohio, in which twelve horses died—all that had been taken with it. Its contagious character was proved by the fact that isolation of affected animals prevented its extension. In Steuben County, Indiana, a sort of diphtheria prevailed, but no deaths are noted. The remedy recommended is a poultice, two-thirds mustard and one-third lard, around the throat, alternating with a dose of three drops of belladonna and three drops of aconite. A few cases of lung congestion are also stated. In some counties the cause of these maladies is directly stated by the correspondent to be undue exposure to the severity of the winter. Very few brain diseases are noted, though a tendency to spinal meningitis is mentioned by one

correspondent. In Hardin, Ohio, occurred three cases of an unknown disease, involving both lungs and brain, which appeared to be a combination of farcy and glanders. This disease was said to be quite prevalent in the neighboring county of Marion and attended with considerable fatality. In Kosciusko, Indiana, the "pink-eye distemper," generally affecting but one eye, caused blindness in a week or ten days. The same is noted in one or two other counties. In Preble, Ohio, an unknown disease has developed itself, always attacking animals at work. A heavy perspiration sets in, followed by an immediate weakening of the loins and sudden prostration to the earth without ability to rise; the appetite does not fail till death ensues. In Houghton, Michigan, a cutaneous disease has as yet produced no deaths. Blotches form upon the skin; the hair comes off, and a yellowish-green fluid exudes, but the spots soon turn purple and run together. The remedy suggested is two doses of salts per day, four ounces each, and washing the spots with a quart of soft water in which have been dissolved an ounce of sugar of lead and an ounce of soda. Coles, Illinois, reports several deaths of young horses from an affection of kidneys. De Kalb notes two fatal cases of lockjaw.

In the States west of the Mississippi River lung diseases take the lead in the northern counties, and brain diseases in the southern counties. In Antelope, Nebraska, 23 cases of epizootic influenza proved fatal. Nicollet, Minnesota, also reports some deaths from the same. The old distemper took on a virulent type in some counties, as in Sherburne, Minnesota; and Hardin and Mahaska, Iowa; it was more destructive among very young horses. The tendency of these diseases to more destructive forms is also noted. Pneumonia, pleuropneumonia, and lung fever are credited with numerous casualties. Laryngitis prevailed to some extent in McLeod, Minnesota. The blind staggers is of frequent mention in Missouri and Kansas, and is attributed by several of our correspondents to feeding musty corn. In Stoddard, Missouri, forty horses died of this complaint. In Ellis, Kansas, this malady was complicated with paralysis, and caused many deaths. This was probably the disease noted by our correspondent in Washington, Missouri, where many horses fed on worm-eaten corn died. Stomach diseases, colic, bots, &c., are occasionally mentioned with sporadic cases of poll evil, &c.

The prevailing types of disease upon the Pacific coast were such as affect the breathing organs. Siskiyou, California, lost many fine horses from this class of maladies, and Trinity reports four deaths from heart disease. The blind staggers is reported in one or two counties of Oregon, and is by one correspondent attributed to hay mixed with fern or other weeds.

The reports from the Territories show a smaller range of type diseases than in the States, but similar within the same isothermal parallels. The "Spanish fever" is noted in the Indian Territory as affecting horses brought from the North.

SHEEP.

The condition of sheep throughout the country is very good. There is an increasing disposition to provide this class of farm animals with shelter during the inclement season of the year. To this more than to any one cause may

be attributed the absence of epizootic forms of disease following the severity of the late winter.

In New England, a few cases of grub in the head or foot-rot still exist, notwithstanding energetic measures have been taken within the last few years to expel these maladies entirely. Kerosene oil is relied upon in Carroll, New Hampshire, to destroy the grub. In this county complaint is made of the ravages of dogs, by which the numbers of sheep have been reduced. Beyond these this section of the Union presents no other cases of disease.

The condition of sheep is also very encouraging in the Middle States. In nearly all the counties reporting the condition on coming out of winter quarters is pronounced good, and in several others fair; only six correspondents report poor or bad condition. Foot-rot is noted in seven or eight counties, but in several of these the malady is very mild, in one or two only nominal. One or two correspondents mention scab or grub in the head, but the infliction was light. An occasional note of dissatisfaction is heard over the ravages of dogs. Increased care is bestowed upon this class of farm animals.

Farther south in the South Atlantic States the same preponderance of good condition also appears, but the mildness of the climate tempts the farmer frequently to neglect some of those precautions which have been so beneficial farther north, especially good shelter. But neglect of this kind is becoming less common, and hence sheep-husbandry is indicating higher possibilities by producing better results than in late years. Several counties, especially in Maryland and Virginia, report a marked increase of numbers. The ravages of dogs are more destructive here than farther north, but public opinion is being prepared for a stringent protective legislation. Of prevalent diseases foot-rot, grub in the head, and sheep distemper constitute the staple. Black tongue and scours, with a few cases of unknown maladies, are reported from five or six counties. Calvert, Maryland, reports several deaths from eating ground ivy. Halifax, Virginia, reports a heavy loss of lambs from exposure. In Dinwiddie, however, the demand for spring lambs counteracts the tendency to neglect them. Lambs large enough for marketing command \$6 per head. Orange, Virginia, lost many lambs from scab, "a distemper as fatal as cholera among hogs." Greenville, North Carolina, lost heavily from "white skin," a very contagious disease, attacking sheep in all stages. In Bertie, North Carolina, an unknown malady produced great mortality. The animal becomes subject to fits and its blood is greatly dried up. When dead, the wool pulls off perfectly clean and the stomach, on examination, shows a state of mortification.

The general condition of sheep in the Gulf States is good, the majority of our correspondents reporting no prevalent forms of disease. But toward the southwest, in Louisiana and Texas, the number reporting actual maladies increases. Of these, fourteen Texas counties report the presence of scab. This disease has largely propagated itself through the neglect of measures for its suppression and extirpation. While the general sanitary conditions of the year have been good, this evil could not have obtained such extensive foothold if it had been promptly and judiciously treated. Foot-rot is noted in several counties—five or six. Greene, Alabama, reports flocks losing 50 to 75 per cent.

from this disease. Grub in the head, dysentery, lung fever, and several undescribed and unnamed maladies did considerable injury in isolated localities. In Sumter, Florida, sheep, like cattle, are injuriously affected in the hilly land, but improved by transfer to the flat and prairie section. Two diseases, one the "paper skin" or "white skin," and the other unnamed, but consisting mainly of a swelling under the jaw, discharging a virulent white matter, were quite fatal in Jackson, Mississippi. An unknown disease also inflicted great injury in Franklin, Louisiana. Very heavy losses from neglect and exposure are also noted. In Bexar, Texas, one flock lost 300 out of 1,600, and another in Mason lost 1,500 out of 3,500. Another flock of 5,000 in the same region lost only 1 per cent. The difference is the result of intelligent care, which in the latter case removed all tendencies to disease. An ill-tended flock is peculiarly liable to scab or foot-rot. Heavy losses from dogs are reported, and, in Putnam, Florida, from bears.

In the Southern inland States our correspondents report a large proportion of the flocks in poor condition, though the large majority are good and without any prevalent forms of disease. The scab is noted in four counties in Arkansas, but in no other State of this region. The foot-rot is more common to the north and east in Tennessee, West Virginia, and Kentucky. Grub in the head and paper-skin also appeared in isolated localities. Several correspondents emphatically note a lack of care and very slim feeding as causing such diseases, or, at least, as enlarging their malignant scope. In all sections of the South, however, a great improvement, compared with former years, is noticeable. In Logan, Arkansas, a new disease, resembling pneumonia, was quite fatal, destroying from 25 to 90 per cent. of different flocks. The lack of water for sheep while the streams were frozen in winter caused very serious constipation, resulting in the loss of 10 per cent. of the flocks of a portion in Shelby County, Kentucky. In Nicholas and Shelby, just after the cold spell of January, many sheep became very stupid and refused food; after moping with depressed heads for three or four days, death supervened. Loss from this source was very heavy. No remedies were found of any effect. In Fayette 25 per cent. of the lambs and 5 per cent. of the mothers died during the lambing season. Losses by dogs were severe in several counties.

The condition of sheep on coming out of winter quarters was remarkably good in the States north of the Ohio River, only three counties being graded as "poor." Of diseases, the foot-rot is acknowledged in eleven counties of Ohio, one in Indiana, three in Illinois, and one in Wisconsin; but in nearly all these cases this disease is of narrow range and of mild type. Scab is noted in six or seven counties of the whole region, and grub in the head in four or five. The pale disease or paper-skin is mentioned in three counties. Several remedies have been found more or less effective in different places. For worms in the intestines, the alleged cause of the pale disease, our correspondent in Perry, Ohio, recommends ground pumpkin seeds steeped in warm, not boiling, water. A liberal supply of salt and a little copperas in drinking-water acts as a preventive. For grub in the head our correspondent in Branch, Michigan, notes the excellent effects of tar applied to the nostrils every fort-

night during July and August. Scab is treated in several counties with strong decoctions of tobacco. But all the losses from the above-named diseases are small in comparison with the ravages of dogs. Several of our correspondents in this section express themselves in strong but justifiable terms in regard to the neglect of legislators in providing safeguards for this most important branch of agricultural production.

The States west of the Mississippi report "poor condition" of sheep in only four counties. The diseases of this section are of about the same range and character as in the States just east of them. Not a single correspondent in Minnesota reports any kind of sheep malady. In Iowa, scab, foot-rot, and "shetches," are noted in three or four counties. In Missouri and Kansas scab was present in seventeen counties, and in two in Nebraska. Foot-rot is noted in four or five counties and grub in the head in as many more. Stone County, Missouri, had some cases of "staggers," probably "hydatids of the brain," a species of vertigo produced by a parasite, *Cœnurus cerebralis*, the eggs of which are swallowed by the sheep and find a lodgement in the brain. Only lambs are liable to this infliction. Washington, Missouri, reports an unknown disease, in which a nervous tremor attacks the animal, which finally becomes helplessly paralyzed. In Shawnee, Kansas, considerable abortion was produced by feeding sheep on refuse sorghum. The dog nuisance is very severe in this section also.

On the Pacific coast the condition of sheep is less encouraging than east of the Rocky Mountains, a larger proportion of counties being graded "poor" than in any other section. In Stanislaus, California, it is noted that lambs, in many flocks, were killed to save the ewes. The disease most generally noted in either California or Oregon is the scab, but this was not very severe in any of the counties reporting. Flukes in the liver were troublesome in Linn County, Oregon. Dogs and wolves were very destructive in some localities of this region.

From the Territories our only reports of poor condition come from five or six counties in New Mexico and Washington. Of diseases a few counties report scab, probably the result of neglect, as in the States. Our correspondent in San Miguel, New Mexico, reports a number of deaths from a disease bearing a strong analogy to the yellow fever in the human system; the skin, flesh, and wool turns a yellowish hue. As might have been expected in a pioneer country, wolves, wildcats, and other savage animals prey heavily upon the flocks, but "worthless curs" have inflicted far heavier losses.

CATTLE.

New England correspondents all report the condition of cattle from fair to good; no counties are graded as "poor." Feeding has generally been sufficient in quantity and judiciously managed. Winter quarters in this region means good shelter from the severity of the weather, together with due care for all the wants of the animals. The general satisfaction expressed is good evidence that this care has been exercised, and stock will come out generally in a fine condition. Of diseases, Knox County, Maine, reports some cases

of garget or *mammitis* in cows. The correspondent asks a remedy. Dr. Teller, in his late work on the "Diseases of Live Stock," describes this disease as an inflammation of the udder or mammary gland to which cows in plethoric condition at calving time are especially liable; sometimes it results from allowing cows to remain unmilked for some time. The whole udder is seldom attacked at once, but one or two quarters at a time are inflamed; the milk becomes curdled, whey-like, and mixed with blood. The whole animal system sympathizes with the disturbance, as is shown by restlessness, impaired appetite, disordered bowels, and shivering or excessive surface heat. If not arrested the inflamed parts suppurate, and the organization of the udder is measurably destroyed. The treatment recommended is moderate purging; half pound of salts should be followed up with doses of two ounces of saltpeter in water night and morning. Very little water should be given, and only such food as does not produce milk. The milk should be frequently drawn with hand or siphon. For more elaborate treatment of this disease the correspondent is referred to the work itself, published by H. C. Watts & Co., Philadelphia. Franklin, Vermont, reports a few cases of "black-leg," probably a type of the "charbon," or "bloody murrain," reported in the South. Pleuro-pneumonia is dubiously mentioned in New Haven County, Connecticut; a few cases are said to have occurred in one locality, but the report is denied.

The condition of cattle in the Middle States is "fair to good" in all the counties reporting except six. Only 11 per cent. of the counties reporting show any sort of cattle malady, and of these the type is generally mild. Prominent in importance is the pleuro-pneumonia which is reported in two counties in New York, four in New Jersey, and one in Pennsylvania. Untrustworthy reports of the disease in other counties were also in circulation, but receive little credence. In Hudson, New Jersey, the cases were introduced from the stables of New York and Long Island, where cows are fed upon distillery slops. The cases noted appear to have been mostly sporadic, and no indication is given of the transmission of the disease by contagion. The State of New Jersey established a rigid quarantine to prevent the introduction of diseased cattle. Of other diseases one correspondent in New York reports garget; in Pennsylvania, lung fever, puerperal fever, black-leg, and murrain are reported in as many different counties. Delaware presents a remarkably clean bill of health, though her record of condition is not perfect; no disease of any kind was noticed in the State. One county reports a few cases of "horn-ail," a disease which generally results from neglect and imperfect nutrition. Several correspondents in the dairy districts note abortion in cows. A very singular malady produced some deaths in Somerset, New Jersey. A *post-mortem* examination showed the lungs and throat full of worms, the windpipe having been nearly eaten away. The worms were white, from 2 to 6 inches long, and about the size of a No. 6 needle.

About 30 per. cent. of the counties in the South Atlantic States report a "poor" condition of cattle coming out of winter quarters, and the remainder fair to good. Of diseases, Maryland notes only a few cases of pleuro-pneumonia among dairy cows in the vicinity of Baltimore. Of 68 counties in Vir-

ginia, 58 note a gratifying absence of all disease. Three counties report the black-leg, and three the disease very indefinitely indicated by the term murrain; in this case it is possible that what is called black-leg in other counties is intended. Halifax County lost several animals from what is called the "Carolina distemper," from the fact that it originated with cattle brought from North Carolina. Its symptoms are those of a violent fever. Our correspondent recommends the following as a preventive: Place in the drinking-troughs a bushel of the purest red clay mixed with one gallon of salt, eight ounces of saltpeter, four ounces of flowers of sulphur. Mix these ingredients with water to the consistence of mortar. The cattle will lick this mass with great zest, and where it has been supplied to a herd no case of this malady has been developed. One county had some cases of horn-ail, or hollow-horn, and another complains of "ticks." North Carolina enjoyed a very considerable immunity from disease, though her record of condition is not so high as in the two States north of her. One county complains of pneumonia, another of distemper, and a third of "milk disease," probably the result of poisoning by swamp vegetation. Our correspondent in Wake reports among his own cattle a singular disease of gravid cows. They fall sick at calving time, lose flesh and appetite, and have a strange rattling in the head. Our correspondents complain of a general lack of intelligent care in the treatment of this as well as other classes of farm animals. South Carolina enjoyed a marked exemption from cattle diseases, notwithstanding their low condition in many counties. One correspondent, noting cases of death by hollow-horn, is disposed to name "hollow belly" as the real malady. Georgia notes the "murrain" in five counties and distemper in three; "swelled neck" and "black tongue" are reported in two counties each; lock-jaw and Spanish fever in one county each. In Liberty County some animals died from a disease resembling blind staggers in horses. There is a very general complaint of defective feeding. The winter has been unusually long and severe; hence, farmers have not been prepared for an extended feeding. The general mildness of the Southern winters induces the Southern farmer to neglect the preparation of shelter for farm animals. In an exceptional winter, like the last, this neglect is sure to tell upon the vital condition of stock.

In the Gulf States about half the counties report cattle as coming out of winter quarters in poor condition. Here the unexpected severity of the season caught farmers as usual without supplies of dry food to last until spring vegetation should start. Hence a large number of animals were very poor when the season really opened. In some counties large numbers died of sheer starvation. In Suwannee County, Florida, this disease is called the "lifts." Three counties of Florida report murrain, two black tongue, and two hollow-horn. A disease called "salt sickness" is reported in two coast counties. The cause of this disease is unknown, but is supposed to be poisoning by some sea-shore plant. Since the appearance of the black tongue, in 1858, in Santa Rosa, cattle have been liable to a sort of rheumatic affection. *Post-mortem* examination of such cases shows a softening and brittleness of the bones of the legs. In Alabama two counties report hollow-horn, one murrain, and one black tongue. In Mississippi pneumonia, black tongue, and murrain are each

reported from one county. In Prentiss County there is a new disease, in which death comes by a sort of paralysis. In Hancock a disease resembling blind staggers in horses was fatal in some cases. In Louisiana a few deaths from murrain are reported. In Texas murrain is mentioned in two counties, and Spanish fever, pneumonia, black-leg, and black tongue in one each. Lavacca County reports an unknown disease, which is supposed to result from neglect and starvation. In Collin an insect called the "screw-fly" caused some mortality. It deposits its eggs at some point where it can get access to fresh blood, and from these are hatched worms, which, if not destroyed, will soon destroy the animal. Calomel applied to the parts affected effectually abates the nuisance. At several points in this section of the Union an effort has been made to improve cattle by introducing short-horns from Kentucky and other fine breeds from different parts of the country.

In the Southern inland States about one-fourth of the counties report poor condition of cattle. The record of diseases, however, is insignificant. In the counties of this region, comprising four States, twelve report murrain, two black-leg, one hollow-horn, one Texas fever, three puerperal fever. In Brooke, West Virginia, the milk of some cows peculiarly affected becomes ropy, and has the appearance of being pervaded by cobwebs. Most of the disease in these States is the result of imperfect nutrition. Many cattle died of starvation.

Of the five States north of the Ohio about 5 per cent. report cattle coming out of winter quarters in poor condition. Diseases are reported in a small number of counties, viz: Black-leg in three, murrain in four, hollow-horn in one, Texas fever in one, itch, &c., in one, tendency to abortion in one. Several counties in Ohio and Indiana note the puerperal fever. One correspondent in Clark County attributes this difficulty to the fact that cows, immediately after calving, are allowed to drink to repletion of cold water. In Oakland, Michigan, early in the winter, several deaths occurred with symptoms indicating smut poisoning; but some of these fatal cases occurred in cattle not fed upon corn or corn fodder. An unknown disease in Leelenaw carried off some cattle; symptoms: rough coat, loss of appetite, craving for bark, rotten wood, or something dry besides grain, costiveness, general decline; no remedy known. A disease with somewhat similar symptoms is reported in Wexford. In Emmett County a disease called "grub in the tongue," is characterized by loss of flesh and appetite, and by a craving for sour food. In Wabash, where a number of cattle were said to have died of smutty corn, it is generally believed that death was caused by allowing the animals to gorge themselves in an imperfectly husked cornfield, and then failing to provide them with water. In Greene, Illinois, some deaths occurred from Spanish fever, native cattle having been permitted to come in contact with animals from Texas. Dodge County, Wisconsin, reports a disease called strangulation, and several fatal cases of bloat.

In the States west of the Mississippi River less than 1 per cent. of the counties grade their cattle condition as "poor." The black-leg is reported in twenty-six counties. The Texas fever appears in three counties in Missouri and two in

Kansas. Smut poison is noted in seven counties in Iowa and five in Nebraska; and murrain in two counties in Missouri, one in Kansas, and eight in Nebraska. In Chippewa, Minnesota, a few died from "grub in the back." In Meeker, for a year or two, cattle have been troubled with a round lump swelling in the throat, sometimes rising 6 inches, from which there is a discharge of matter. In Iowa, as also in adjoining States, a marked mortality is noted upon turning cattle into husked cornfields. It is believed that lack of drinking-water is the main cause of this fatality. In Vernon, Missouri, a number of cattle were affected with mad-itch, which was, in almost all cases, fatal.

On the Pacific coast, California correspondents report a cattle condition uniformly fair or good, but in Oregon 40 per cent. of the reports indicate poor condition. The sanitary condition of the coast, judging from the lack of reported diseases, is very excellent. Sonoma, California, reports a little murrain, and Trinity three deaths from what resembles blind staggers in horses. Oregon reports no diseases of any kind. Nevada reports a disease called "big-jaw."

The Territories report a few sporadic cases of Texas fever, murrain, and over-eating cornstalks.

DISEASES OF SWINE.

In the New England and Middle States, and on the Pacific coast, sections in which but a small proportion of our hogs are raised, diseases of this class of farm animals are comparatively insignificant. But in the various sections of the South, and especially in the great hog-producing regions of the West, great destruction is reported in a large number of counties from malignant contagious epizootics. Our correspondents complain of the confusion in popular thought which causes the grouping together of diseases of very opposite character and symptoms under the general name of cholera. It is desirable that more correct ideas on this subject be disseminated, and that swine-raisers should learn to distinguish more accurately between the different forms of disease to which their stock is subject. Several new works of special value on the diseases of live stock have lately appeared. It is desirable that these should receive an extended circulation as the means of enabling farmers to understand more fully one of the special difficulties that beset this branch of production.

Dr. Teller, in his "Diseases of Live Stock," states that the term "cholera," in popular parlance, includes three forms of disease. The first of these is the anthrax or splenic fever, which finds its counterpart in the charbon in sheep, cattle, and horses. The most common form is called the "white bristle," in which the poison is localized in a carbuncular swelling under the throat, the bristles on the spot becoming white and brittle. The swelling extends inwardly, involving the breathing organs and producing final suffocation. Sometimes the true apoplectic or splenic form, analogous to the more common symptoms of charbon in other animals, is found, but this class of cases is not numerous. The flesh of hogs dying of any form of anthrax is poisonous, and not only spreads the disease among swine, but may induce in the human system the deadly "malignant pustule."

The second species of so-called hog-cholera enumerated by Dr. Teller, is the contagious *pneumo-enteritis*, a specific inflammation of the lungs and bowels showing itself through red or purple blotches on the skin. This is the most common and fatal form of "hog-cholera" in this country. It is superinduced by extremes of temperature, wet seasons, damp feeding-grounds, foul drinking-water, close, filthy, styies, &c. The sudden increase, at fattening time, of heating concentrated food, also tends to develop it. The germ of the disease around which all these unfavorable conditions crystallize is probably of a fungoid character. This disease is subdivided into two minor forms: 1st. Erysipelatous; 2d. Malignant sore throat.

The third species of hog-cholera is a malignant epizootic catarrh, located in the nostrils, windpipe, and lungs. The brain is affected, more or less, by the disorder as well as the lymphatic system, as shown by enlarged glands and scrofulous ulcerations.

Quinsy, lung fever, black-tooth, and a few other sporadic maladies are reported in different parts of the country, but their range is narrow and local, and their effects insignificant. The remarks of several of our correspondents go to enforce a truth already dawning upon the minds of the great mass of hog-raisers that the diseases with which these animals are affected are due mostly to the lack of sanitary conditions, to defective and improper food, and to general lack of cleanliness. When this lesson shall have been thoroughly learned by American farmers, we may expect a marked declension in the destructive diseases which have swept, from time to time, the hog-producing regions of the country.

EXTRACTS FROM CORRESPONDENTS.

MAINE.—*Sagadahoc*: Not one instance of disease is reported. *Androscoggin*: Few cases of cholera. *Knox*: When kept in exposed places are affected with rheumatism, for which there is no known remedy. *Valde*: Healthy.

NEW HAMPSHIRE.—*Carroll*: Healthy and looking well generally. Owing to the great numbers and low price there were many kept over.

VERMONT.—*Orleans*: About 10 per cent. of the pigs died last summer and fall; no cause assigned. *Franklin*: Some affected with a weakness in the hind quarters, supposed to result from close confinement.

MASSACHUSETTS.—*Dukes*: Healthy condition generally.

CONNECTICUT.—*Hartford*: Healthy. *Windham*: Cholera in several places.

NEW YORK.—*Columbia*: But little disease and small loss. *Seneca*: No sickness of consequence. *Wayne*: Ten per cent. have died of an unknown malady. They lose use of their hind legs and die in a few days. *Albany*: Many have been attacked with paralytic symptoms in the hind legs, which gradually extends to the fore legs and spreads over the body, causing death. This is confined to those fed on swill from the institutions in the city. Some have lost 40 per cent. of their entire stock. *Monroe*: Looking better than usual. *Cattaraugus*: No disease worth noting. *Oswego*: No prevailing disease. *Suffolk*: Cholera in some sections. *Chautauqua*: Condition healthy. *Schenectady*: No disease during the year.

NEW JERSEY.—*Salem*: Better health than for some years; no particular disease. *Morris*: Free from disease. *Middlesex*: Several remote cases of an affection of the spine, crippling the animal and causing death. *Camden*: Cholera has been prevalent. *Burlington*: Cholera has made sad ravages on some farms during the year. *Essex*: Quite healthy.

PENNSYLVANIA.—*Armstrong*: Almost entirely exempt from disease, and in good condition. *Berks*: Some few cases of cholera. *Cambria*: A few deaths from cholera. *Clinton*: Have been unusually healthy. *Franklin*: Cholera to some extent. *Union*: Many pigs have died

without showing much evidence of sickness; present condition is not good. *Warren*: There never has been a case of cholera recorded in this county. *Bucks*: Neglect, in many cases, gave rise to cholera last year. *Columbia*: Pigs from two to eight weeks old have been dying from some unknown cause this spring; they become very feeble, and sometimes linger for two or three weeks.

MARYLAND.—*Queen Anne*: Cholera to an alarming extent last fall; where it appeared, was unmanageable. *Baltimore*: Hog-cholera last fall; no cases now. *Carroll*: No diseases. *Harford*: Quite a number lost from cholera; no cases since cold weather set in. *Montgomery*: Less cholera than formerly; health and condition 100. *Talbot*: No disease. *Prince George's*: A few cases of cholera in one locality in this county. *Saint Mary's*: No prevailing disease. *Wicomico*: Generally healthy. *Worcester*: No disease.

VIRGINIA.—*Bland*: Are looking well. *Bath*: Free from disease; in frail condition. *Brunswick*: Better generally than at any period since the war; two or three cases of cholera in the county. *Cumberland*: Many cases of cholera, with fatal results. *Essex*: Generally in a good healthy condition, though there are cases where farmers, through inattention, have lost heavily from cholera. *Floyd*: Remarkably healthy; no losses worthy of note. *Halifax*: Cholera still prevails in some sections of the county, causing much loss; an effectual remedy badly needed. *Richmond*: Cholera has prevailed to a serious extent; in some instances destroying the entire stock. *Sussex*: With the exception of cholera, they have been free from disease. *Amelia*: Cholera, and no remedy for the disease will avail anything. *Charles City*: Hogs properly treated, healthy; poor treatment is the "so-called" cholera here. *Fauquier*: Cholera almost the only disease known here among hogs. *Greenville*: Cholera destructive. *Northumberland*: Many have died from a cough caused by unusually cold weather. *Westmoreland*: Cholera has been very fatal in some districts. *Rockbridge*: Some few have died from an unknown malady, dropping off without premonitory symptoms; loss small. *Henry*: Mortality very great from cholera. *Buckingham*: No diseases reported. *Lee*: Freer from disease than for many years.

NORTH CAROLINA.—*Granville*: Fewer cases of cholera than previously; generally prevails extensively in this county. *Mecklenburg*: Few cases of cholera are reported. *Montgomery*: Farmers are paying more attention to improved breeds. *Wayne*: Cholera has prevailed considerably. *Pamlico*: Cholera reported; sulphur, saltpeter, salt, and copperas good remedy and preventive. *Greene*: Cholera prevailed, but not as general as usual; seems to be spreading. *Cabarrus*: A small quantity of lye-soap put into a trough is an excellent preventive against cholera. *Rockingham*: Cholera, though to no great extent. *Pitt*: Mortality in cholera has been chiefly among pigs. *Madison*: Unusually free from disease during the past year. *Iredell*: Cholera has prevailed here more or less during the whole winter, which is rather unusual. *Davie*: Cholera has prevailed to some extent. *Martin*: Comparatively free from disease during the year. *Macon*: Have been remarkably free from disease. *Gates*: Cholera still lingers. *Alamance*: About one-fourth have died from cholera. *Rowan*: A great many have died with cholera and quinsy. *Randolph*: A few cases of cholera are reported. *Wilson*: Some cholera, but less than usual.

SOUTH CAROLINA.—*Abbeville*: Many have died from unknown causes. *Orangeburg*: Cholera has prevailed with fatal results. *Williamsburg*: Considerable loss from cholera and quinsy. Quinsy managed with salt and ashes, but no remedy for cholera. *Clarendon*: Suffered from a disease known as cholera; loss considerable. *Horry*: In better condition than has been known for years.

FLORIDA.—*Santa Rosa*: A few cases of cholera. *Taylor*: Losses from cholera. *Marion*: Heavy loss from cholera and "thumps." *Columbus*: Great loss from cholera; never heard of a remedy that proved beneficial. *Putnam*: Some farmers have lost three-fifths of their entire stock from cholera.

GEORGIA.—*Calusa*: No prevailing disease during the year. *Coffee*: Many have died from cholera, which seems to be permanent. *Forsyth*: A few cases of cholera. *Jones*: Thousands have been destroyed by cholera; every known remedy applied with but little beneficial effect. *Tyrrel*: No disease but cholera, and that not severe. *Troup*: Some cholera; generally the result of unhealthy quarters and inattention. *Union*: Free from disease; more

numerous and in better condition than for years. *Upson*: Cholera prevails to a greater or less extent every year. *Gwinnett*: Many have died with cholera. *Heard*: Loss from cholera great. *Liberty*: Many supposed to have died with epizooty. *Meriwether*: Cholera to an alarming degree. *Dodge*: Few cases of cholera. *Baker*: No disease whatever. *Cobb*: Heavy loss from cholera during last summer and fall. *Elbert*: Cholera, prevalent. *Habersham*: No specific disease. *Hancock*: A large percentage have died with cholera, and others with an unknown disease. *Henry*: Cholera. *Jefferson*: Cholera to an alarming extent; one farmer reports a loss of 360 head; one party completely cured an affected lot by feeding a few bushels of wheat which had been soaked in bluestone, and there has been no returning symptoms of the disease. *McDuffie*: Cholera, but confined to a small area. The pamphlet of Dr. Janes of the bureau of agriculture of this State has been a great benefit to hog-raisers. *Stewart*: Cholera has been very fatal. *Scriven*: Cholera and distemper. *Macon*: It is said many are dying of cholera, but the indications are "starvation." *Lee*: No disease recorded. *Dawson*: Many have died with cholera. *Charlton*: Heavy losses from cholera. *Hart*: Cholera.

ALABAMA.—*Dale*: Many are now dying with cholera and yellow sweat. *Greene*: Cholera has prevailed to some extent. *Jefferson*: A few cases of quinsy and cholera, but general condition good. *De Kalb*: Cholera and quinsy have prevailed to an alarming extent in portions of the county, in some instances destroying whole herds. *Clarke*: Fewer cases of cholera than usual. *Franklin*: No disease. *Crenshaw*: A few cases of cholera. *Baldwin*: Cholera not as prevalent as usual.

MISSISSIPPI.—*Yazoo*: Much influenza, produced by want of proper shelter and bedding during bad weather. *Noxubee*: About 66 per cent. have died from cholera during the season. *Hancock*: A few deaths from cholera; at present in a healthy condition. *Bolivar*: No disease and in fine condition. *Leake*: At least 50 per cent. died during 1878 from cholera. *Calhoun*: Many have died with mange; generally in bad condition. *Alcorn*: About 10 per cent. died with cholera. *Sumner*: Comparatively free from disease during the year; some sections are now suffering with red mange. *Pontotoc*: Deaths have occurred from red mange. *Franklin*: Cholera, but has been confined to certain districts. *Amite*: No disease. *Tippah*: Good health has prevailed for some months; some cholera last year. *Choctaw*: Freer from disease during the past year than usual. *Lee*: Poor, but healthy.

LOUISIANA.—*Cameron*: No disease; condition poor. *Franklin*: About 25 per cent. of the stock in this county have died from supposed cholera.

TEXAS.—*Angelina*: Remarkably healthy; an occasional case of cholera. *Comanche*: A few fatal cases of cholera; not general. *Dallas*: Cholera has been prevalent and fatal, especially among pigs. *Fort Bend*: Cholera to a ruinous extent; many farmers lost their entire stock. *Grayson*: Many cases of cholera and lung disease. *Lavaca*: About 50 per cent. in the county have died from cholera; it is still prevailing. *Titus*: Cholera and red measles. *Anderson*: Free from disease where they have received reasonable attention. *Collin*: A few isolated cases of cholera. *Houston*: Numbers destroyed by cholera. *Rockwall*: Generally healthy; a few cases of cholera. *Upshur*: The prevailing diseases are cholera and red mange; the latter most prevalent but less fatal. *Williamson*: Have done well during the year; but little loss from disease.

ARKANSAS.—*Clark*: So-called cholera to a limited extent. *Crawford*: In some instances cholera has carried off 75 per cent.; the general average for the county is about 40 per cent. *Card*: Less disease during the past twelve months than for many years. *Logan*: Some loss from cholera during the fall and winter. *Johnson*: Cholera to some extent. *Woodruff*: A few cases of cholera; good health as a rule. *Marion*: A large percentage have died during the last summer and fall with cholera. *Montgomery*: Cholera prevailed to an unusual extent last fall; some farmers lost their entire stock. *Sebastian*: Have been remarkably free from disease; in fair condition generally. *Scott*: Some cases of cholera, but better health generally than usual.

TENNESSEE.—*Smith*: The so-called "cholera" has prevailed to a considerable extent. *Montgomery*: Cholera is the only disease with which they are affected. *Monroe*: Some cases of cholera. *Bradley*: Cholera prevails extensively and fatally. *Anderson*: No diseases ex-

cept the old familiar one, which for a bet'er name is called, often wrongly, "cholera"; want of sanitary measures the cause. *Haywood*: Generally healthy; some have died during the fall and winter with lung disease. *Henry*: Some cholera, though less than usual. Many young pigs have died with sore eyes; a fatal disease and no remedy known. *Jackson*: Cholera has prevailed. *Campbell*: Fewer cases of cholera the last year. *Knox*: With the exception of a few cases of cholera no disease has prevailed. *Lake*: Cholera very fatal in southern portion of this county. *McMinn*: Better health than for years. *Sevier*: Mortality great during the year from cholera. *Johnson*: No disease. *Marion*: Generally healthy during the past year. *Shelby*: From 75 to 90 per cent. destroyed by cholera in sections of county. *Macon*: Cholera has prevailed.

WEST VIRGINIA.—*Grant*: Some deaths caused by kidney disease; not contagious. *Ohio*: A few cases of hog-cholera. *Pleasants*: A few isolated cases of so-called cholera. *Raleigh*: No cholera or peculiar disease. *Tucker*: Some small losses by cholera. *Wirt*: Some fatal cases of cholera. *Hampshire*: Cholera, rather prevalent. *Morgan*: Cholera. *Marshall*: Cholera to some extent. *Jefferson*: About 25 per cent. were lost by cholera. Spirits of turpentine—a gill to four hogs, given in slop, once or twice a day—is recommended as a remedy. *Monroe*: Cholera has killed many hogs. *Lincoln*: Some cholera. *Wetzel*: Cholera has been very fatal in some localities. *Nicholas*: Cholera. *Wood*: Some deaths from cholera. *Mason*: A few cases reported as cholera, but in all probability they were sore throat. *Ritchie*: Cholera to some extent. *Boone*: Cholera to a limited extent.

KENTUCKY.—*Shelby*: In some localities, where hogs were bedded on manure piles without proper care during the cold weather, many died of pneumonia; no cholera. *Marshall*: Cholera. *Warren*: Some complaint of cholera, but less than some years. *Ohio*: Cholera; a great many have died for want of food and good quarters. *Nicholas*: No epidemic; but some have died with the thumps, caused by huddling together too much in beds during the very cold weather. *Logan*: A fatal disease has existed for the past few years. Not so many cases last year; probably the number of hogs diminished. The disease is not understood by the farmers; no efforts made to prevent its spread or means devised to effect its cure. *Lewis*: Hog-cholera has swept off whole droves. Many remedies have been tried, but without success. *Laurel*: Some cases of Quinsy. *Kenton*: A little cholera, but condition good generally. *Cumberland*: Some have died with cholera, and many young hogs have died with thumps or something similar. *Lincoln*: About usual loss by cholera. *Fayette*: Not as many deaths from cholera as in former years. *Crittenden*: A few cases of cholera. *Christian*: Thirty-three per cent. have died with cholera. *Johnson*: A few cases of cholera. *Henry*: A few cases of thumps. *Henderson*: Not as much cholera as in former years. *Harrison*: Some deaths from pneumonia, a few from skin disease contracted by lying in dirty beds, and some have become covered with lice, which proves fatal if they enter the ear. *Hardin*: About half the number of deaths from cholera that there was last year. *Anderson*: A few deaths from cholera. *Scott*: Usual amount of cholera. *Hopkins*: Some cholera, but not as fatal as former years. *Rowan*: Cholera. *Monroe*: Cholera. *Graves*: Some cholera. *Bath*: Large numbers died with cholera.

OHIO.—*Auglaize*: A contagious disease (supposed to be cholera) has been quite prevalent and many deaths are reported. This disease presents itself in two different forms: in some cases, by loss of appetite, vomiting, and purging, and generally a speedy death; in others, by a cough, high fever, stiffness, constipation, and loss of appetite. Violent exercise is recommended for the former, but should not be practiced for the latter. It is said that wood-ashes mixed with charcoal and salt, or pine tar, will act as a preventive. *Champaign*: A few cases of cholera. *Holmes*: A little cholera. *Defiance*: Some cholera. *Perry*: Loss by cholera about one-half of 1 per cent. *Preble*: Some losses by cholera. *Ross*: Heavy loss by cholera; some farmers have given up hog raising. *Wyandot*: Some cholera and a few cases of thumps among small pigs. *Williams*: But few losses, caused generally from exposure. *Pickaway*: None of consequence; the cholera has almost, if not entirely, disappeared. *Miami*: A few cases of cholera. *Logan*: None but a case here and there of cholera. *Hardin*: A few cases of cholera. *Guernsey*: Cholera quite fatal in some localities; no specific remedy known. *Franklin*: Some cholera, but not as much as formerly; no reliable remedy

yet discovered. *Darke*: Some cholera. *Adams*: Cholera prevailing in some localities. *Paulding*: Cholera. *Mahoning*: A few cases of cholera. *Clinton*: Some cholera. *Allen*: About 8 per cent. of the hogs have died with cholera; can be checked by separating the diseased ones from the herd, thoroughly disinfect their sleeping quarters, frequent changes of food, such as roots, slop, and corn; give at least once a week corn cooked in wood-ash lye. *Warren*: Cholera to considerable extent among young hogs. *Union*: But few deaths this year from cholera. *Putnam*: Number of hogs reduced one-half, attributed in part to neglect or indisposition to raise new stock, and partly from the ravages of the cholera. *Pike*: Loss of 10 per cent. by cholera. *Noble*: In one township the thumps carried off quite a number. *Henry*: Loss of 10 per cent. by cholera or pneumonia. *Wood*: At distilleries a large number have died from cholera. *Ottawa*: A few died in Bay Township from cholera. *Montgomery*: No disease, except cholera, which has made large inroads on the numbers. *Clermont*: Some cholera, but generally healthy. *Hightland*: Some cholera. *Richland*: Cholera to some extent.

MICHIGAN.—*Houghton*: A few cases of cholera. *Leelanaw*: None whatever; never have had hog-cholera. *Berrien*: Some cases of so-called cholera; thinks the disease is misnamed, as it is confined to the lungs and kidneys. *Cass*: Some deaths from cholera (so called); is of the opinion that many of the cases are caused by diseased lungs. *Saginaw*: Some cholera. *Saint Joseph*: In a few localities some cases of cholera.

INDIANA.—*Clay*: Some cholera. *Decatur*: A few cases of cholera; some loss among shoats, caused by sleeping under barns, around straw-stacks and manure piles; clean, well-ventilated quarters is a preventive of the latter disease. *Morgan*: Loss of 20 per cent. by cholera. *Rush*: Some cholera. *Warren*: Many died with cholera. *Putnam*: Some cholera yet prevails. *Carroll*: A great variety of destructive diseases. *Steuben*: Five hundred hogs died, mostly from cholera. *Ohio*: Some cholera or lung disease. *Madison*: Loss about 10 per cent. by cholera. *Knox*: Some cases of cholera. *Clarke*: The cholera in this county has about disappeared. *Adams*: Cholera has prevailed to a greater extent than ever before. *Dubois*: Fifteen per cent. have died with cholera. *Ripley*: Many hogs destroyed by a disease supposed to be cholera. *Lawrence*: In some localities the cholera has been exceedingly fatal. *Kosciusko*: Many deaths by cholera (supposed). Some farmers lost nine-tenths of all they had. *Jennings*: Much less cholera than last year. *Elkhart*: Loss of about 5 per cent. by cholera. *Whitley*: Some cases of cholera; no remedy found. *Starke*: In one locality many died with cholera. Not many hogs raised in this county. *Shelby*: Cholera still continues to take off large numbers. *Clinton*: But little cholera this year. *Wells*: Some cases of cholera and quinsy. *Switzerland*: But slight loss by cholera. *Dearborn*: An occasional case of cholera. *Tippecanoe*: Cholera. *Brown*: Hogs above six months old have been comparatively healthy; under that age the loss has been severe. Very few have lived that were farrowed since September. Many sucking pigs died while the mother appeared to be in good health. *De Kalb*: Heavy loss by cholera (supposed), death ensuing generally in one day, but sometimes they linger for a month. *Franklin*: Some cholera. *Grant*: Some cholera and quinsy. *Hamilton*: Some cholera, thumps, and cough, but not as heavy losses as in former years. *Hendricks*: None but cholera. *Noble*: Cholera quite fatal among young hogs. *Owen*: Cholera, but not to such an extent as heretofore. *Tipton*: Some cholera. *Jefferson*: Not as much cholera as last year. *Pike*: One-sixth destroyed by cholera.

ILLINOIS.—*Adams*: Some cholera, but not as much as usual. *Bond*: About 600 died with cholera. *Brown*: Some deaths from so-called cholera. In some cases the lungs only are diseased; in others the bowels; and some suffer from worms. *Christian*: Some deaths from cholera, typhoid fever, and sore eyes. *Cook*: A very few cases of cholera. *Coles*: Cholera has been quite disastrous; the loss will be about 40 per cent. *Clark*: About 35 per cent. loss by cholera. *Cass*: Cholera to a limited extent. *Cumberland*: A new disease called by some "bull nose" The nose of the hog first begins to shorten and turn up, obstructing breathing. It is a lingering disease, but is said to be certain death, and is thought to be contagious. *Calhoun*: Cholera to some extent. *Carroll*: Some cholera. *De Kalb*: Loss of about 2,500 hogs by maladies, generally called cholera. *Douglas*: About one-fourth destroyed by so-called cholera. *De Witt*: Destruction by cholera to the extent of about \$50,000. *Edgar*: Cholera

not as bad as in former years by 20 per cent. *Edwards*: Fewer deaths than usual by cholera. *Fayette*: Cholera, but not as general as in previous years. *Ford*: Some deaths from lung fever. *Fulton*: About 20 per cent. of last year's crop died with cholera. *Greene*: Loss about 25 per cent. by cholera; generally most fatal about the time the pigs are weaned. *Hardin*: Fully 10 per cent. died with cholera; no remedy known. The disease appears to be worse along low lands and streams. *Hamilton*: Cholera quite fatal in some portions of the county. *Henry*: Cholera quite prevalent. *Hancock*: Cholera, but with some perceptible abatement; better sanitary treatment is the only effective remedy yet known. *Jefferson*: Cholera and quinsy. *Jersey*: Some few cases of cholera. *Kankakee*: A few cases of cholera. *Kendall*: Some severe losses by cholera. *Knox*: Pneumonia has taken off more hogs than cholera; the former is too frequently taken for the latter. *Livingston*: Cholera to some extent. *Logan*: Have been less affected with cholera than last year. *Lee*: The mortality has been very great, some farmers losing as many as 500. The disease was called by most people cholera, by others diphtheria, but the best breeders attribute it to too much interbreeding. No complaints among breeders of the Chester whites. *Lawrence*: About two-thirds of our hogs have died with cholera. *La Salle*: Loss by cholera about 25 per cent. *McHenry*: Loss of about 2 per cent. by cholera. *McDonough*: Cholera and pneumonia. A louse or tick killed many shoats; some have died from long white worms in the stomach. *Marion*: Loss of 2 per cent. by cholera. *Macon*: Cholera not as fatal as last year. *Morgan*: Heavy losses by cholera; no remedy has been found. *Madison*: Some cholera. *Mason*: Cholera. *Moultrie*: Cholera quite fatal among young hogs. *Montgomery*: Cholera or lung disease; loss about 30 per cent. *Ogle*: Cholera or pneumonia to a less extent than previous years. *Putnam*: Considerable loss by cholera, and some losses from catarrh in the nose, causing it to become crooked; lingering illness before death. *Perry*: But few cases of cholera. *Pope*: Not as much fatality as previous year by cholera. *Rock Island*: Loss by cholera about one-fourth. *Richland*: Some cases of cholera. *Sangamon*: Some cholera, pneumonia, blind staggers, &c. *Stephenson*: Heavy losses from what is indiscriminately called cholera. *Scott*: Some cholera; parched corn is recommended as a remedy. *Shelby*: Cholera has almost disappeared; hogs have been troubled with a hacking cough. *Stark*: Considerable cholera. *Tazewell*: Cholera appears to be gradually dying out. Burnt corn is used as a remedy. *Vermillion*: Cholera has taken off large numbers. *Washington*: Cholera. *Whitesides*: Heavy losses from cholera. *Williamson*: In some localities cholera has made a clean sweep. *Wayne*: Many hogs have died with what is generally called cholera. A portion of the deaths may have been from lung fever, caused by sudden changes from a warm bed to cold mud and rain. Remedy, one ounce arsenic to about 12 hogs. *Winnebago*: Cholera. *Warren*: Hogs continue to die with cholera; some farmers losing all they had. *Johnson*: A few cases of cholera. *McLean*: Some cholera. *Piatt*: Cholera, but not as bad as former years. *Pike*: Some cholera. *Union*: Some cases of cholera. *Peoria*: Cholera to a greater extent than ever before. *Gallatin*: But little cholera.

WISCONSIN.—*Dunn*: Some deaths in one locality from cholera. *Green*: Some cholera.

MINNESOTA.—*Clay*: Many of the young pigs have died; probably from cold quarters and high breeding. *Crow Wing*: Black tooth has been troublesome; some deaths from cholera. *Sibley*: Some cholera. *Wadena*: The mortality among young pigs is quite large; cause unknown.

IOWA.—*Adair*: Some deaths from cholera; others from worms and kidney disease. *Adams*: Cholera to a moderate extent. *Appanoose*: Heavy losses from cholera; some cases of quinsy and worms. *Benton*: Loss of one-sixth by cholera. *Black Hawk*: A few cases of cholera. *Boone*: Fully two-thirds destroyed by cholera and influenza. *Buena Vista*: A very few deaths from cholera. *Cherokee*: Many cases of cholera; treated by some by feeding turnips, cabbage, and soapuds. *Clinton*: Heavy loss by cholera. *Des Moines*: Cholera still prevalent. *Dallas*: Cholera. *Decatur*: Loss by cholera about 50 per cent. *Franklin*: Numerous deaths from cholera and quinsy. *Greene*: In some localities heavy loss by cholera. *Grundy*: Diphtheria, cholera, and worms. *Guthrie*: Considerable loss by cholera. *Humboldt*: Twenty-five per cent. loss by cholera. *Hamilton*: Heavy loss by cholera. *Harrison*: Not as much cholera as in previous years. *Henry*: Disastrous losses by cholera. *Hardin*: Disastrous loss by cholera and quinsy. *Howard*: But very few deaths

among hogs. *Iowa*: Quinsy and cholera to some extent. *Ida*: Many deaths from lung fever; some call it cholera. *Johnson*: Cholera, but to a less extent than heretofore. *Jackson*: In some localities the loss has been from 50 to 75 per cent. *Jasper*: Cholera, but not so extensively as formerly. *Kossuth*: Something like diphtheria. *Linn*: Large losses from cholera. *Lucas*: A few cases of cholera. *Muscatine*: A very few cases of cholera and lung disease. *Mahaska*: Cholera not as destructive as in former years. *Marion*: Congestion of lungs, influenza, and cholera; many deaths by the two first named. *Montgomery*: About one-third died with cholera. *Monona*: Cholera. *O'Brien*: Some cholera or quinsy. *Plymouth*: Pneumonia, cholera, and kidney disease. *Pottawatomie*: Some cholera. *Story*: Cholera. *Taylor*: Some cholera. *Washington*: Heavy losses by cholera; liberal use of beets and artichokes is much relied on.

MISSOURI.—*Audrain*: Cholera and pneumonia. *Atchison*: Cholera, but not as fatal as previous years. *Andrew*: Pneumonia or lung fever have been quite fatal. *Adair*: Some cholera. *Bates*: Numerous cases of cholera. *Boone*: Have suffered from cholera, but not as bad as last year. *Camden*: Loss by cholera about 40 per cent. *Cedar*: A very little cholera. *Carroll*: A little cholera. *Caldwell*: Loss of about 3 per cent. from various causes. *Chariton*: Some cases of lung disease. *Cass*: Cholera has been very fatal. *Cooper*: Cholera to limited extent. *Cape Girardeau*: Some deaths from cholera. *Daviess*: Some cholera; also, colds from overheating in their beds. *Dade*: Cholera to a limited extent. *Greene*: A number of diseases prevailed (all called cholera); fatality not as great as formerly. *Gasconade*: Cholera. *Gentry*: A very few deaths from cholera. *Holt*: Cholera, but not as bad as in previous years. *Howard*: Cholera and blind staggers. Burnt corn is recommended for the former disease. *Henry*: Twenty-five per cent. loss by cholera. *Harrison*: Some cholera. *Jefferson*: Some cases of cholera and thumps. *Johnson*: Some cholera, and a few deaths from colds. *Jasper*: Hog cholera to considerable extent. *Knox*: A few cases of cholera. *Lawrence*: Severe losses by cholera (or Gordon's fever). *Laclede*: Some quinsy and cholera. *La Fayette*: Hogs are healthier than they have been for years. Some deaths, probably caused from sleeping in straw ricks, and severe colds. *Livingston*: Usual number of deaths from various causes. No matter what the symptoms may be, it is given the name of cholera. *Lincoln*: Cholera. *Marion*: Cholera and quinsy; numerous deaths. *Moniteau*: Great decrease of cholera. Burnt corn said to be a specific for this disease. *Maries*: Hogs have been healthier than for four years; but few cases of cholera. *Mercer*: Heavy losses from cholera, quinsy, and pneumonia. *Miller*: Some cholera. *Nodaway*: Loss by cholera 15 per cent. Brazilian artichokes fed plentifully act as a preventive. Sulphur as an alterative and copperas as a tonic are also recommended. *New Madrid*: A good many deaths. Some die vomiting and purging, and others have sores that eat out the flesh. "All deaths among hogs are called cholera." *Osark*: Cholera. *Osage*: Cholera and measles. *Pike*: But little loss by disease. *Polk*: Some cholera. *Pemiscot*: Many died with cholera. *Phelps*: Every ailment of the hog is called cholera. Considerable loss from various causes. *Putnam*: Constipated bowels, vomiting, loss of appetite, &c., all called cholera. *Pulaski*: Loss by cholera about one-sixth. *Ralls*: Cholera to the usual extent. *Randolph*: Cholera still prevails, but not to the extent that it did last year. *Stoddard*: Loss of 5 per cent. by cholera. *Schuyler*: Cholera, but not as bad as a year or so ago. *Stone*: Cholera. *Sullivan*: Some kind of lung disease (generally called cholera). *Saint Louis*: No disease for the past two years. Blue mass is recommended as a cure for so-called cholera. *Scotland*: More than half the hogs have died with cholera. *Saint François*: Cholera. *Saint Charles*: Lung fever (called cholera), but not as fatal as other fevers. *Shelby*: Cholera, but not as much as formerly. *Vernon*: Cholera to some extent. *Worth*: Loss 20 per cent. by cholera. *Warren*: Very little of what is called cholera. *Wright*: Cholera to some extent. *Washington*: Cholera to considerable extent. Turpentine and raw turnips are used as a preventive. Remedy: boil green pine tops, and put in a thin paste made of coarse flour and water, adding a little turpentine.

KANSAS.—*Atchison*: A few cases of cholera. *Allen*: A little cholera. *Brown*: Cholera. *Cloud*: Some deaths; by some pronounced cholera, by others quinsy. *Douglas*: Some cholera. *Jefferson*: Less cholera than for the past six years. *Leavenworth*: Cholera to small extent. *Linn*: Some cholera. *Mitchell*: Occasional deaths from intestinal fever. *Mar-*

shall: Heavy loss by cholera. *Miami*: Cholera not as bad as for the past two years. *Neosho*: Some deaths from throat disease. *Ottawa*: Some herds troubled with worms; no cholera. *Republic*: Same disease as last year, but not as bad; called by some quinsy, by others cholera. *Reno*: Some deaths from the kidney worm. *Sumner*: Some cholera. *Washington*: Some deaths from lung fever and quinsy. *Wyandotte*: Cholera to some extent. *Woodson*: Cholera to a great extent; no remedy.

NEBRASKA.—*Antelope*: About 150 deaths from quinsy. *Cass*: Heavy loss from quinsy and fevers (called cholera). *Douglas*: Slight loss by cholera. *Dodge*: Greater loss by cholera than in any previous year. *Gage*: The loss of hogs has been occasioned mostly by smothering one another. *Johnson*: Cholera, said by some to be produced by worms. *Otoe*: Some cholera. *Platte*: Considerable loss by cholera. *Pawnee*: Very little cholera. *Richardson*: Some little cholera. *Saunders*: Cholera. *Washington*: Some cholera. *York*: A few cases of cholera.

OREGON.—*Clackamas*: A disease resembling staggers, apparent contraction of the tendons of the legs; many die. *Multnomah*: New disease; sudden loss of appetite, bloat a little and foam at the mouth; death ensues generally in two days.

CALIFORNIA.—*Contra Costa*: Quinsy. *Yuba*: A few cases of cholera.

DAKOTA.—*Lawrence*: Loss of about 10 per cent. from various diseases; principal symptoms, hard breathing, coughing, sore eyes, and blindness. *Yankton*: Some deaths from diseased liver.

INDIAN TERRITORY.—*Choctaw*: A good many deaths from a disease called cholera. *Cherokee*: The diseases among hogs have about subsided.

NEW MEXICO.—*Santa Fé*: Scurvy.

WASHINGTON.—*San Juan*: Considerable loss by exposure.



DEPARTMENT OF AGRICULTURE.

SPECIAL REPORT—No. 14.

REPORT

UPON THE

CONDITION OF CROPS

JUNE 1, 1879.



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1879.

JUNE REPORT OF GROWING CROPS.

NOTICE.—In consequence of many letters received by this Department urging a more prompt publication of our Monthly Report, and of some unfavorable criticisms by the newspapers regarding what they are pleased to term our want of dispatch in the matter, we feel compelled to state, in our own justification—

1. That the Monthly Report is compiled from reports from our numerous correspondents, received after the 1st until the 12th of the month.

2. That on the latter day we close the account, begin our calculation, and by the 15th are in condition to give a synopsis to the telegraphs.

3. That as early as the 18th the matter in detail goes to the Public Printer; and that the delays there occurring are beyond our power to control.

The unfortunate delay in the publication of Special Report No. 13 was due in some degree, it is presumed, to the presence of other public printing incident to the extra session of Congress.

WINTER WHEAT.

The condition of winter wheat, June 1, averaged but 90 against 98 last year. The leading cause of this falling off was drought, which is reported as extending over the whole wheat region for a greater or less period during the winter and spring. In the South, also, complaints are numerous of winter-killing, especially of broadcast crops, the winter temperature having ranged lower than for many years. In the Middle, Western and Northwestern States the Hessian fly had made formidable demonstrations; the chinch-bug is noted at one or two points, while in several trans-Mississippi counties the dreaded grasshopper had caused serious apprehensions.

The small crop of New England is deficient about 6 per cent. Here the main difficulty was drought. The Middle States fall 14 per cent. below average, being visited by drought and Hessian fly in numerous counties. The South Atlantic States fall 4 per cent. short, notwithstanding the high averages of 108 in South Carolina and 112 in Georgia. Rust is reported in some counties of this section. The Gulf States are 17 per cent. below average, Texas being deficient 28 per cent.; the drought was very severe in this region. The Southern Inland States are 12 per cent. below average; from this section come complaints of excessively short straw, the result of drought. The States north of the Ohio River average 95, Indiana as high as 103. Here some broadcast crops also suffered from freezing in winter; the Hessian fly was more or less injurious in several counties. The trans-Mississippi States fall 21 per cent. below. The Pacific States are over average.

SPRING WHEAT.

ACREAGE.—The total acreage sown in spring wheat is about 4 per cent. greater than last year. The great increase is on the Pacific coast, where California enlarges her area 10 per cent. New England and the trans-Mississippi States each report an increase of 5 per cent. Texas, the only Southern State growing spring wheat to any extent, reports her area about the same as last year. Of the States north of the Ohio River, Ohio and Indiana make no reports of spring wheat; the other three States fall off about 3 per cent. The States beyond the Mississippi River report an increase of 3 per cent.; while Iowa declines 1 per cent., the other States of this region enlarge their area, Minnesota and Nebraska each reporting 9 per cent. increase.

CONDITION.—The condition of spring wheat is about the same as of winter wheat, being subject to the same spring conditions of growth. All the States are below average.

TOTAL WHEAT ACREAGE.—The total acreage in both winter and spring wheat has increased about $2\frac{1}{4}$ per cent. in the States. In the Territories, wheat raising has advanced more rapidly westward than statistical inquiries have been able to reach. In this section there has been a vast enlargement, which must be left to subsequent inquiry. The department has information that in one county of Dakota, in which 50 acres were last year sown, the area has been increased to 4,000 acres. Many other cases of astonishing increase have been reported. The following notes of correspondence are appended:

MAINE.—*Piscataquis*: Sowed early and is looking well; acreage increased.

VERMONT.—*Chittenden*: Fair condition, but greatly in need of rain.

NEW YORK.—*Albany*: Badly injured by drought. *Saint Lawrence*: Looking well. *Genesee*: Slightly injured by drought. *Livingston*: A little more than last year, but 25 per cent. below average. *Schuyler*: Affected by cold and drought, and now ravaged by the fly. *Broome*: Materially injured by drought. *Erie*: Improved by late rains. *Fulton*: Backward, owing to spring drought.

NEW JERSEY.—*Mercer*: Suffered very much last winter from exposure, there being very little snow; looks badly in some sections. *Hunterdon*: Some complaints of injury from the Hessian fly, but the main cause of bad condition was the extremely severe winter, followed by unfavorable spring. *Morris*: Fly reported in sections. *Warren*: Not more than half a crop. *Middlesex*: Injured generally by the Hessian fly. Unless some remedy can be discovered for this pest, or a wheat unaffected by it be found, the culture of it in this section must cease.

PENNSYLVANIA.—*Adams*: Looking rather badly. *Armstrong*: Badly injured by the fly last fall; at least 20 per cent. below an average. *Beaver*: Dry weather and the fly have reduced the average. *Clearfield*: Affected by continued dry weather. *Clinton*: Seriously affected by the fly. *Cumberland*: Prospects good. *Northampton*: Better than last year. *Cambria*: Short in stalk, but well headed. *Lawrence*: Dry, cold May retarded the growth so that the present condition is not above 50. *Lehigh*: Looked well up to the first of April, but high winds slightly reduced the condition. *Lycoming*: Looks well on the river bottom, but somewhat dwarfed. *Montgomery*: Brought up to average by late favorable weather. *Bucks*: A very poor stand. *Butler*: Unfavorable winter and spring have reduced the condition to about 45. *Venango*: Looking badly; some fields very thin stand.

DELAWARE.—*Sussex*: The present condition is a full average, but will be reduced unless we have rain very soon.

MARYLAND.—*Caroline*: Crop cut short by drought; no rain since April. *Worcester*: Crop shortened by drought. *Calvert*: The low average is caused by the late severe winter. *Carroll*: Headed up well, but too thin on the ground, owing to drought. *Montgomery*: Severe winter and dry spring affected the condition, but late favorable weather has produced a great improvement. *Cecil*: In some parts of the county injured by recent hail-storm, but general condition good. *Queen Anne*: Late seeding in the fall and subsequent unfavorable weather greatly injured the crop, but late rains have materially improved the condition, and the present prospect is for a full average crop.

VIRGINIA.—*Amelia*: Present indications good for a full average crop. *Bland*: At present thin, but rapidly improving. *Caroline*: Injured by the severity of the winter, but recovering in the present favorable weather. *Floyd*: At least 50 per cent. frozen out during the winter. *Greenville*: Severe open winter and unprecedented dry spring have reduced the condition. *Goochland*: Injured by severe winter and drought, but favorable weather will yet produce a full average. *Halifax*: No complaint of fly or bug, and crop apparently healthy. *Middlesex*: Growth has been retarded by dry weather, but recent rains have improved the condition greatly. *Prince William*: Damaged by cold and spring drought. *Botetourt*: That sowed broadcast almost an entire failure; late drilled very thin; the whole below an average. *Campbell*: Exceedingly unpromising; suffering from a protracted drought. *Charles City*: Some rust on the blade; present condition about 100. *Hanover*: The past three weeks' drought has reduced the average materially, although it has not looked well since fall. *Lunenburg*: Suffered from severity of winter. *Montgomery*: One-half was winter-killed; the remainder greatly improved. *Orange*: Seriously injured by the fly; improved by late rains. *Pulaski*: Badly winter-killed; stand very thin; condition otherwise good; quality better than last year. *Tazewell*: Growth retarded by unfavorable spring, but improved by late rains. *Brunswick*: Injured by cold during the winter; not affected by rust; a little larger crop than last year. *Chesterfield*: Advanced with heads well developed and grain plump; some fields will be cut by the 6th June, and general harvest by the 10th. *Highland*: Injured by open winter, and cold, dry spring. *Lancaster*: Materially affected by drought. *Northampton*: Winter crop looking well, but acreage small. *Rockingham*: Affected by drought. *Russell*: Injured by drought.

NORTH CAROLINA.—*Chowan*: Crop short, owing to cold and drought. *Duplin*: Will be cut in ten days, and if rust does not appear soon, may be above average. *Forsyth*: Prospect better than last year. *Greenville*: Injured by cold; condition now good. *Haywood*: About 25 per cent. below average. *Iredell*: Suffered greatly from drought. *Mecklenburg*: Injured by cold, open winter. *Transylvania*: Seriously injured by cold and frost. *Bladen*: Looking unusually well at this time. *Greene*: Injured by extremely cold, open winter. *Jackson*: Healthy and promising. *Caldwell*: Two weeks ago it promised well, but since damaged by heavy rains; condition about 100. *Martin*: Much better than last year, yet the yield will not reach average. *Randolph*: Condition 110; if not injured there will be a full harvest. *Alleghany*: Crop short, owing to severe winter and backward spring. *Alexander*: Some complaint of rust; condition fair. *Wilson*: Promises to be an average crop, and free from rust. *Gates*: Backward owing to late spring, but now looking well. The same will apply to other crops.

SOUTH CAROLINA.—*Fairfield*: Full average; ready for harvesting. *Oconee*: Early sown injured by frost; late sown quite promising. *Abbeville*: Entirely free from rust and remarkably fine; harvest under way. *York*: Unusually good. *Chesterfield*: Affected by rust. *Clarendon*: Decrease in area, but the favorably season has brought up the condition to about 130. *Lexington*: Suffered severely from freezing. *Spartanburg*: Commenced harvesting last week in May; crop very good.

GEORGIA.—*Baker*: Rusting badly. *Berrien*: About a fortnight late; injured by

lice. *Catoosa*: Notwithstanding the drought, it has suffered from rust. *Clarke*: Prospect never better. *Dooly*: About matured, and looking well. *Fannin*: Late and un-uniform; injured by cold in January. *Foreyth*: Above average, with prospect for very large crop; 10 per cent. increase of acreage. *Gordon*: Rust reported at some points, but crop good. *Gwinnett*: Free from rust and will be ready for harvesting in about ten days; apparently the finest crop since 1863. *Hall*: Prospect excellent. *Hart*: In fine condition; will be ready for harvesting in about ten days. *Jackson*: If not affected before harvest a very fine crop will be made. *Jasper*: Weather favorable and many farmers now cutting; some well-manured fields will make 40 bushels per acre. *Jones*: Just commenced harvesting; turning out better than was expected; weather favorable; about equal to last year. *McDuffie*: Favorable spring has raised the condition to an average. *Milton*: Never in better condition, and if not affected in ten days will be ready to harvest. *Pike*: Now harvesting. *Troup*: But slightly affected by rust; above average. *DeKalb*: Some rust, but crop not yet injured. *Henry*: Quite good; harvested much earlier than usual. *Jefferson*: Looking well notwithstanding many backsets. *Bartow*: Generally backward. *Columbia*: Late rains have greatly improved the crops; an abundant harvest expected. *Hart*: Weather favorable and crop in good condition.

ALABAMA.—*Saint Clair*: Unless affected very soon we will have a fine crop. *Calhoun*: Later than usual; free from rust; harvest in some sections. *DeKalb*: Some little rust, but looks unusually well. *Franklin*: Late, but looks well. *Morgan*: Condition very fine. *Winston*: Harvest under way; crop far better than was anticipated; grain of superior quality.

MISSISSIPPI.—*Choctaw*: A fair average crop.

TEXAS.—*Bastrop*: In many localities a failure, owing to continued dry weather. *Comal*: Almost a failure from drought. *Comanche*: Seriously injured by drought. *Dallas*: Will not exceed half a crop; drought. *McLennan*: Generally harvested; crop fair. *Mason*: Condition greatly reduced by winter drought; spring crop also seriously affected. *Young*: Condition very fine; harvest well under way. *Burleson*: Harvested about half a crop. *Burnett*: Suffered greatly from extraordinary drought. *Grayson*: Injured by drought. *Bezar*: Almost an entire failure. *Fayette*: Seriously affected by continued drought. *Upshur*: Harvested; about an average yield; grain finer than last year. *Anderson*: Materially damaged by late heavy flood, previous to which the prospect was unusually promising. *Atascosa*: Destroyed by drought. *Eastland*: Almost a failure; drought. *Menard*: Suffering greatly for rain. *San Patricio*: Seriously injured by a most ruinous drought; almost an entire failure.

ARKANSAS.—*Crawford*: About average. *Saline*: Prospect never better. *Independence*: Condition about average. *Marion*: Condition rather low; drought. *Sebastian*: Thin, but heads well filled. *Garland*: Spring drought cut short our prospect 20 per cent.; heads small, but well filled. *Franklin*: Unfavorable fall, cold, open winter, and dry spring have combined to reduce materially both condition and yield. *Howard*: Thrashing commenced; crop injured at least 20 per cent. by rust. *Pope*: The prospect was very flattering in April; since then the rust has made its appearance and reduced the condition at least one-third, although the grain is not so badly damaged as usual.

TENNESSEE.—*Bradley*: Growth affected by cold and drought, but quality good. *Blount*: Affected by rust, and rather thin on the ground. *Campbell*: Injured somewhat by rust and fly. *Knox*: Prospect very fine; 20 per cent. above average. *Meigs*: A little thin but heading well. *Monroe*: Destroyed by late killing frost. *Rutherford*: Injured by freezing; few fields have a full stand; grain will be well developed; harvest ten to twenty days late. *Unicoi*: Low and thin, but in fair condition; will be well filled. *Gibson*: Acreage 20 per cent. less than last year, but the condition promises a good average crop on low lands; much improved within the last month. *Grainger*: Much winter-killed condition low, resulting from the continued drought, which has

affected all crops. *Greene*: Generally a fair average condition, but affected by the fly and rust in some sections.

WEST VIRGINIA.—*Brooke*: Seriously injured by drought. *Ohio*: Good strong rains may yet increase the yield. *Grant*: Suffering for rain. *Hampshire*: Prospects brightened by recent rains. *Marshall*: Have had the driest and latest spring for years. Some of the farmers will be almost ruined unless it rains soon. Acreage increased, but it is feared the average will fall below 75. *Mercer*: About average. *Monroe*: Considerably frozen out last winter. *Morgan*: Injured somewhat by dry weather in spring, but presents prospect good. *Raleigh*: Fair. *Upshur*: Injured by April drought. *Cabell*: Injured seriously by drought; great improvement by late rains. *Braxton*: Drought shortened straw and heads. *Barbour*: Injured; no rain in May. *Doddridge*: Very short; needs rain badly. *Greenbrier*: On account of cold, dry weather, thin on the ground and heading out low. *Harrison*: Cut short by drought; cannot make a full crop. *Mineral*: Worst prospect ever known. *Monongalia*: Owing to winter-killing and spring drought there will be many fields that will not realize the seed sown. *Putnam*: Irreparable injury from drought; good rains may improve the crop on the river bottoms. *Ritchie*: Materially injured by spring drought. *Roane*: Extensively injured by spring drought. *Wayne*: Seriously injured by drought. *Wetzel*: Wintered well, but the drought has caused it to head close to the ground; crop will be light. *Randolph*: Injured badly by drought. *Pendleton*: Some improvement since late rain.

KENTUCKY.—*Boone*: Suffering from drought. *Cumberland*: Very promising. *Greenup*: Injured by continuous drought. *Lewis*: Some portions of the county have suffered by the drought. *Anderson*: Quite short; have had but one rain in seven weeks; will require copious showers to make it average 75. *Bourbon*: Over an average acreage sown, but the drought has injured the prospects. *Calloway*: Average; a portion will be too low to cut. *Carroll*: Injured daily by drought. *Crittenden*: Low, and heads short. *Daviess*: Low, but heads well filled; fair prospects for average yield. *Edmonson*: Never was a better prospect for a full crop. *Johnson*: Damaged by drought. *Kenton*: Injured by drought; quite short on poor lands. *Lincoln*: Stood the winter well, but the drought caused low growth and short heads. *Logan*: Average; not affected by drought. *McLean*: Present condition 25 per cent. better than last year. *Meade*: Owing to continued drought some wheat is heading out one foot high; some injury by the fly. *Montgomery*: Cut short by drought; heading low and small. *Shelby*: Severely injured by drought; many fields will not be high enough to cut. *Todd*: Cold, dry spell in April has injured the prospects. *Washington*: Rainfall latter part of May will improve the grain crop. *Warren*: Present prospects very fine; indications of an early harvest and the heaviest crop ever raised in the county. *Lirington*: Damaged by drought. *McCracken*: Recent rains will improve prospects. *Metcalf*: Winter wheat almost a failure; headed out low; is short and small. *Scott*: Headed out low; a large portion has good heads, but will be short for binding, which will cause a loss. *Spencer*: Recent rains improved the prospects. *Allen*: Early winter wheat is low and thin but well headed; looks better than it did last year, as it is free from rust; harvest about two weeks late; late wheat badly injured by drought. *Bath*: Prospects improved by recent rains. *Breckenridge*: Very backward. *Ballard*: Injured to some extent by drought. *Carter*: Wintered well, but very much damaged by drought, particularly on uplands. *Fayette*: Will not yield a half crop; badly injured by drought. *Fleming*: Most unfavorable prospect for years. *Henry*: Somewhat retarded by drought. *Jessamine*: Cut short by drought. *Nicholas*: About average; will be very short on thin land, both in straw and head. *Rowan*: Looks badly. *Russell*: Promises about a half crop. *Lyon*: Rains have improved prospects. *Owen*: Severely injured by drought. *Taylor*: Backward; badly rusted, and may be greatly injured. *Oldham*: About ready to cut; promises good grain and a fat yield. *Union*: About average; improved by the rain.

OHIO.—*Ashland*: Materially injured by spring drought; needs rain badly. *Allen*:

Drought has injured all growing crops; warm rains may bring wheat up to average. *Adams*: Great damage by drought and the fly; many fields will not make a half crop. *Belmont*: Severe drought has caused spring crops to look badly. *Brown*: Injured by drought. *Ashtabula*: Suffered severely by drought. *Athens*: Badly injured by drought. *Carroll*: Winter wheat headed out very short, with small heads; on uplands the blades are turning yellow. *Coshocton*: Materially injured by drought. *Franklin*: Much retarded by drought. *Butler*: Improved by light rains. *Guernsey*: Injured by drought. *Highland*: Shortened by drought; some injury by the fly. *Holmes*: Retarded by drought. *Hardin*: Improved since rain. *Huron*: Heads of good length, but straw short. *Hocking*: Finest prospects for several years. *Jefferson*: Short crop; injured by drought. *Knox*: Prospects very poor. *Lake*: Suffered materially by drought. *Logan*: Retarded by drought. *Licking*: Short in straw and thin on the ground. *Montgomery*: Retarded by drought. *Medina*: Froze out some and is suffering for rain. *Monroe*: Never looked better. *Miami*: Suffering for rain. *Noble*: Injured by drought; did not stool much; straw and heads both short. *Portage*: Irreparably injured by drought. *Paulding*: Prospects injured by the fly and drought. *Pickaway*: Prospects injured by drought. *Scioto*: Retarded by drought, and injured by the fly. *Stark*: Much improved since rain. *Seneca*: Late sown, and on clay soil, has suffered by drought; early sown, on rich ground, shows a good stand. *Sandusky*: Owing to drought, our prospects are poor. *Union*: Recent rains may bring it up to average. *Wayne*: Retarded by drought; well set, but short in straw. *Wyandot*: Not flattering. *Washington*: Very poor, particularly on uplands; on bottom lands the fly destroyed some fields. *Lorain*: Some fields over average; many winter, killed; straw very short.

MICHIGAN.—*Benzie*: Looks well, but needs rain. *Clinton*: Backward; injured by frost in some localities; not as large an acreage sown as usual. *Hillsdale*: Much improved by recent rains. *Lapeer*: Winter wheat looks remarkably well; no injury by the winter. *Manistee*: Improved since rain; may yet have a fair average. *Muskegon*: Suffering for rain; looked well until retarded by drought. *Macomb*: Suffered by drought; small yield unless it rains soon. *Montcalm*: Looks finely. *Newaygo*: Light growth last fall; injury by March freeze and the spring drought will lower it to 30 per cent. below average. *Saint Clair*: Drought will cause it to fall 20 per cent. below average. *Saginaw*: Last year spring wheat was a total failure, which accounts for the decrease in acreage this year. *Wayne*: Thin, and retarded by drought. *Washtenaw*: Prospects 25 per cent. worse, owing to severity of winter and present drought. *Charlevoix*: Spring wheat has suffered by drought. *Leelenaw*: Improved by recent rains. *Mason*: Winter wheat has suffered by drought; but little spring wheat sown, owing to failure of last year.

INDIANA.—*Adams*: Looks well; plenty of rain. *Clay*: Drought caused short heads and irregularity in height. *Decatur*: Wintered well; spring drought killed the stools and caused short heads; considerable late sown died. *Dearborn*: Badly injured by spring drought. *Hendricks*: Cut short by drought. *Howard*: Suffered by drought; may yet make average. *Huntington*: Greatly improved since last report; promises full crop. *Jefferson*: Suffered some by drought. *Knox*: Considerably injured by drought. *Morgan*: Damaged some by drought. *Putnam*: Never had a finer season. *Madison*: Improved by recent rains. *Noble*: Generally good; spring favorable. *Owen*: Improved since rain; looks fair, but will not harvest as early as last year. *Ripley*: Looks well; prospects for a full crop. *Steuben*: Looks very well. *Shelby*: A portion injured by spring drought, followed by excessive waterfall; may yet be average crop. *Tipton*: Injured by late frosts and drought. *Tippecanoe*: Rain came just in time to save our splendid prospects. *Wells*: Heading nicely, but very short in straw. *Whitley*: Spring a little late; crops look well; a good stand of wheat, and promising. *Wabash*: Heading better than ever before; yield will be very large. *Warren*: Prospects for full crop of winter wheat never better; but little spring wheat sown. *Dubois*: Suffered greatly by drought. *Harrison*: Not materially injured by drought, except late-sown fields. *Pike*: Looks well. *Starke*: Twenty-five per cent. increase of acreage; never looked so promising; winter wheat suits our soil best.

ILLINOIS.—*Brown*: April 1, prospects were flattering for a full crop, but spring drought has damaged it 50 per cent.; spring wheat has suffered very much. *Clark*: Retarded by the backward spring; growing weather now. *Crawford*: Damaged by excessive rains in early spring, followed by drought. *Calhoun*: Damaged materially by drought. *Carroll*: Improved since rain. *Cook*: Suffered from the cold, dry spring. *De Kalb*: Much below average; damaged by drought. *De Witt*: Injured by the cool, dry spring. *Edgar*: Fine condition all over county. *Fayette*: Looks thin; somewhat injured. *Greene*: Cut short 30 per cent. by drought. *Hancock*: Prospects decidedly good. *Jackson*: Cut short by drought. *Jasper*: Injured during winter, and now suffering for rain. *Johnson*: Injured by drought; very light on thin lands. *Kendall*: Retarded by drought. *Kankakee*: Larger acreage of spring wheat than usual, but growth retarded by drought. *McHenry*: Suffered by spring drought, but greatly improved by recent rains. *Adams*: Never looked better on well-cultivated rich lands, but on thin, rolling, and poorly-cultivated land it is suffering for rain. *Edwards*: Cut short by drought. *Ogle*: Winter wheat since rain has a fair appearance; spring wheat injured by drought. *Lirington*: Small acreage sown; looks tolerably well; spring wheat very backward, owing to the cold, dry weather. *Laurence*: Severe winter and drought will cut it down one-third. *La Salle*: Rather thin; below average. *Lee*: Spring wheat looks well; winter wheat excellent; about five times previous acreage sown. *Menard*: Cut short by drought. *Madison*: Winter wheat injured by drought. *Macon*: Short crop, owing to drought. *Mason*: Retarded by drought. *Massac*: Injured by drought. *Pulaski*: Injured by drought; almost a failure on thin lands. *Perry*: Short, does not fill well; some complaint of the fly. *Piatt*: Injured by drought. *Pulnam*: Injured by drought. *Sangamon*: Seriously injured by drought. *Scott*: Cut below average by drought. *Stephenson*: Improved since rain. *Schuyler*: Suffered by drought. *Tazewell*: Suffering for rain. *Vermillion*: Prospects for a heavy crop never more flattering. *Winnebago*: Improved since rain. *Williamson*: Seriously injured by drought. *Wayne*: Uneven and injured by drought. *McLean*: All spring grain will be short; never saw it so dry at this time of year.

WISCONSIN.—*Buffalo*: A little thin; injured some by frost; may be a big crop. *Barron*: Increase of acreage, caused in part by immigration of last year; looks well. *Calumet*: Retarded by drought; worms troubling spring wheat. *Columbia*: Prospects improved since rain. "Grangers' faces have shortened about six inches." *Chippewa*: Very promising. *Douglas*: Looks fair. *Door*: Suffering for rain. *Dunn*: Never looked better. *Green Lake*: Great improvement since rain. *Grant*: Winter wheat injured by drought; spring wheat improved since rain. *Jefferson*: Reduced below average by drought. *La Crosse*: The "Odessa" is looking well; "Lost Nation" not so good. *La Fayette*: Very backward; recent rains will improve it. *Milwaukee*: Small acreage of winter wheat, but looking well; farmers preparing to put in a larger acreage this fall; spring wheat retarded by drought. *Polk*: Much improved by the rain; best appearance for years. *Richland*: Good prospects. *Racine*: Spring wheat injured by frosts and drought; some improvement since rain. *Winnebago*: Good promise. *Wood*: Abundant yield. *Washington*: Does not promise average; on uplands injured by drought. *Walworth*: Winter wheat looks well.

MINNESOTA.—*Anoka*: Spring wheat never looked better; weather favorable for all growing crops. *Becker*: Abundance of rain and good weather; condition never better. *Fillmore*: Most of the wheat sown under grade No. 3; came up well; backward and below average; recent showers may improve it. *Faribault*: Injured by drought; March sown did not germinate until May 10; thin on ground and backward; some improvement since rain. *Goodhue*: Reduced below average by drought; improved by recent rains. *Houston*: Recent rains have improved the condition. *Jackson*: Looks splendid. *Kandiyohi*: No winter wheat sown; spring wheat A No. 1, and far ahead of any ever seen in this county at this time of year. *Lyon*: Large increase in acreage accounted for in part by immigration; never looked better at this time of year. *Le Sueur*: Improved by recent rains. *Meeker*: Spring wheat injured by drought.

improved by recent rains. *McLeod*: Crops growing rapidly; prospects favorable for a heavy yield. *Nicollet*: Improving fast since recent rains. *Nobles*: Good stand on old land and thrifty; on land broken last year it is injured by young grasshoppers, but not to the extent of late-broke fields. *Olmstead*: Prospering finely since rains. *Polk*: Heavy increase of acreage, due mostly to immigration. *Rice*: Spring wheat seriously injured by drought; stand unusually thin. *Ramsey*: Improved since rain; filling out nicely and bids fair; No. 2 seed appears to do as well as No. 1. *Rock*: Average; on old land it promises as well or better than in any former year. About 20 per cent. of the increase of acreage of spring wheat was sown on last year's breaking, on which grasshopper-eggs were deposited, causing considerable damage in some localities. *Sherburne*: Spring wheat in good condition; early and late sown very thin; about a half stand; that sown about April 1 is all that could be desired. *Steele*: Improved since rain; prospects favorable. *Sibley*: Increase of acreage; accounted for in part by immigration. *Swift*: Never looked more luxuriant and promising; yield will be heavy. *Wadena*: Late rains will bring it up to average. *Watoucan*: Looks very fine. *Clay*: Looks well; stood more than in former years. *Stearns*: Backward.

IOWA.—*Allamakee*: Drought has caused wheat to be very backward. *Buena Vista*: A poor stand, caused by drought and high winds; some improvement since the rain. *Cherokee*: Injured by drought and high winds; recent rains have improved the condition; there may be a full crop of the "Odessa"; about 20 per cent. of the "Fife" did not germinate. *Des Moines*: Injured by drought. *Franklin*: Injured by drought and a severe hail-storm. *Fayette*: Improved since the rain. *Greene*: Rather light and thin on ground, but improving rapidly since rain. *Hardin*: Improving since rain; will be average. *Humboldt*: Injured by drought. *Howard*: Early sown makes an extra good show; late sown is thin, seedy, and injured by the drought. *Johnson*: Has not suffered as much as other grains by the drought; the chinch-bug has made its appearance in some fields. *Jones*: Winter-killed somewhat and injured by drought. *Kossuth*: Since the rain it looks as if there would be an average crop. *Lyon*: Injured by drought. Some fields destroyed by grasshoppers, especially in last year's breakings. *Louisa*: Looks splendid, but not the usual length of straw. *Linn*: Some improvement since the rain, but still light. *Montgomery*: Injured by drought and chinch-bug. Cannot rally an average crop. *Monona*: Improved since rain; will fall but little short of an average crop. *Marion*: Winter wheat materially injured by drought; will fill well and ripen early; yield small, but of good quality; spring wheat more than average but for the chinch-bug. *Muscatine*: Fair. *Madison*: Prospects good; some few chinch-bugs, but no damage as yet. *Mahaska*: Since the rain prospects never were better. *O'Brien*: In some localities injured by wind, but a fair average. *Pocahontas*: Improved since the rain; bids fair to make average crop. *Polk*: Retarded by drought; improved since the rain. *Plymouth*: Very light and weedy; grasshoppers injuring many fields; will be thankful for a half crop. *Pottawatomie*: Injured by drought, but improved since the rain. *Sioux*: Spring wheat destroyed by young grasshoppers.

MISSOURI.—*Adair*: Winter wheat looks well; not as much spring wheat sown as usual. *Audrain*: No rain since March; all crops about played out. *Buchanan*: Great injury by drought and fly; some fields entirely ruined. *Benton*: Injured by drought. *Bates*: Badly injured by drought. *Camden*: Badly injured by drought. *Cass*: Much improved since the rain; may reach average. *Carroll*: Winter wheat on fallow land about all winter-killed; chess bloomed in its stead; fields drilled in on corn ground will make something of a crop. *Caldwell*: Hard winter and spring drought have nearly ruined wheat. *Cape Girardeau*: Winter wheat on good land, since the rain, is promising, but on poor land very small. *De Kalb*: Killed early; what remains is very short in straw. *Daveau*: Rain of May 30 may improve it. *Dade*: Rain too late to do much good. *Dent*: Seriously injured by drought. *La Fayette*: Damaged by cold weather in March, followed by drought; early wheat filling very well; recent rains have improved our prospects. *Gasconade*: Prospects excellent. *Gentry*: Cut short by drought. *Greene*: Badly damaged by dry freezing. *Howard*: Short both in straw

and heads. *Holt*: Injured by late freezing; 10 per cent. below last year. *Johnson*: Heading out; straw short; about average. *Jefferson*: Retarded by drought; well headed, but too short to cut well; will make about a half crop. *Jasper*: Much injured by drought. *Knox*: Suffering for rain. *Lewis*: Winter wheat looks remarkably well; may not head well if the drought continues. *Lincoln*: Turning yellow; needs rain very much. *Lawrence*: Not as good as last year; injured by drought. *Laclede*: Not a half crop. *Montgomery*: Much injured by drought. *Miller*: Short, but filling well. *Madison*: Needs rain. *Macon*: Prospects never better. *Marion*: Winter wheat seriously injured by drought; a portion heading out at eight inches, especially on white-oak lands; looks better on heavy and elm lands. *Moniteau*: Injured by severe freezing in March; thin and low, but heading handsomely. *Maries*: Late wheat an entire failure; early sown may fall below an average; Fultz wheat ahead of all other varieties. *McDonald*: Retarded by the drought. *Newton*: Has improved rapidly. *New Madrid*: Winter wheat retarded by drought and injured by rust. *Nodaway*: Good stand of fall wheat, but needs rain badly; spring wheat is being injured by drought and chinch-bugs. *Osage*: Seriously injured by drought. *Putnam*: Injured by drought; chinch-bugs are making their appearance. *Pulaski*: Seriously injured by the drought. *Platte*: Not over a half crop. *Polk*: Badly injured by freezing in March and dry winds. *Phelps*: Early sown winter wheat bids fair; late sown, thin and heading short. *Pettis*: Heading very low. *Reynolds*: Retarded by drought. *Stoddard*: Cut short by drought. *Saint Louis*: Materially injured by drought. *Saint Francois*: Very much injured by drought. *Sullivan*: Retarded by drought. *Stone*: Retarded by drought. *Shelby*: Cut short by drought. *Vernon*: Injured 25 per cent. by drought. *Worth*: Cut short by drought. *Wright*: Damaged by drought. *Warren*: Seriously damaged by drought. *Washington*: Severely injured by drought. *Ripley*: Cut short by drought. *Crawford*: Since last report wheat has been badly injured by drought; much below average.

KANSAS.—*Brown*: Retarded by drought. *Bourbon*: Severe drought; half a crop. *Cowley*: Poor; injured by dry fall and spring and a severe hail-storm. *Crawford*: Injured by drought; will not average over 65 per cent. *Douglas*: Early sown wheat nearly ready for harvest and promises well; late sown has suffered considerably by drought. *Franklin*: Early sown short in straw, but heading well; late sown fields plowed up and planted in corn. *Johnson*: Short but well filled. *Kingman*: Ready for harvest; heads poorly filled; severe drought. The "Walker" wheat looks best. *Montgomery*: Increase in acreage; condition lowered 25 per cent. by drought; harvest has commenced; grain of the early wheat good, but drought and chinch-bugs will damage the late wheat. *Leavenworth*: Vegetation nearly dried up; everything suffering for rain except corn. *Marshall*: Five times as much winter wheat as last year and looking splendid. *Nemaha*: Impaired by drought. *Pawnee*: Large increase of acreage, but crop almost a failure on account of dry fall and spring; but few fields of good winter wheat; where it was drilled in early in September or last of August or on an early June turned sod, it has stood the drought with least injury. *Republic*: Broadcast winter wheat nearly all killed; where drilled deep it promises well. *Rush*: Injured some by drought and high winds. *Reno*: Not a piece of fall wheat that will make a half crop. Hundreds of acres plowed up and planted to corn; hundreds more will not be cut owing to injury by drought and grasshoppers; spring wheat looks very bad. *Saline*: Cut short by drought. *Shawnee*: Fall wheat headed short and thin on ground; spring wheat will be short owing to drought. *Wyandotte*: Suffering for rain.

NEBRASKA.—*Adams*: Never better. *Cass*: Recent rains may bring the crop up to full average. *Clay*: Winter wheat retarded by drought last fall; thin except on low lands, but looks well; spring wheat splendid. *Cedar*: A large area of wheat sown last fall; grasshoppers have destroyed many fields that are now being plowed up for corn. *Hamilton*: Very poor on fall plowed land; on spring plowing will average 11½. *Nemaha*: Hurt badly by drought; rains too late. *Pawnee*: Drought has seriously injured the prospects. *Richardson*: Suffering for rain; chinch-bugs at work. *Saunders*:

Reduction of acreage; drought from August to April prevented much seed from germinating; stand thin. *Washington*: Never looked more promising at this season.

CALIFORNIA.—*Contra Costa*: Season very favorable for late sown grain; above average. *Humboldt*: Spring remarkably late; wheat promising. *Plumas*: Prospects good. *Stanislaus*: Acreage decreased 50 per cent.; not enough rain to enable farmers to prepare the ground last fall. *Santa Clara*: Heavy cold winds. *San Joaquin*: Heavy rains in May caused rust; some injury from frosts; many acres will be cut for grass on account of the foul grasses. *Sonoma*: Too wet since March; fields filled with weeds and cheat. *Del Norte*: Season very wet; in some fields there will be an overgrowth of straw.

COLORADO.—*Larimer*: Both spring and winter wheat in fine condition.

OREGON.—*Baker*: Much more rain than usual; excellent prospects for a large grain crop. *Benton*: Fall and early sown spring wheat looks very well; late sown coming forward finely. *Clackamas*: Winter wheat, promise unprecedented; but little spring wheat sown, as the rains prevented the preparation of the ground. *Grant*: Excellent condition. *Multnomah*: Winter wheat is in good condition; too wet for planting spring wheat.

DAKOTA.—*Hanson*: Never looked better at this time of the year. *Lincoln*: Drought and grasshoppers have about ruined the crop. *Yankton*: Grasshoppers are destroying the wheat fields.

INDIAN TERRITORY.—*Pottawattamie*: Severe drought; all crops short.

NEW MEXICO.—*Taos*: Twenty-five per cent. less of spring wheat sown than heretofore, for the reason that the railroads bring to our doors wheat and other grains cheaper than they can be produced here by our obnoxious system of irrigation.

UTAH.—*Box Elder*: The mountain streams depended on for irrigation of crops are very low; unless we have rainfall soon our crops will be an entire failure. *Cache*: Diminished acreage, caused no doubt by the fears of the grasshoppers; though yet quite small they are doing great damage. *Salt Lake*: Driest spring ever known. All crops suffering. *Tooele*: Unprecedented drought and destruction by grasshoppers render it doubtful if we shall raise our own breadstuffs. *Utah*: Increase of acreage, but grasshoppers are taking everything before them.

WASHINGTON TERRITORY.—*King*: Spring cold, wet, and backward. *Clarke*: Prospects for a full average. Spring has been wet and cold.

COTTON.

The returns indicate an increase in the area planted in cotton of somewhat over 2 per cent.

The percentage as compared with the acreage of 1878 is as follows:

States.	Number of counties reporting.	Acreage.
North Carolina.....	47	106
South Carolina.....	18	100
Georgia.....	71	103
Florida.....	12	97
Alabama.....	28	103
Mississippi.....	39	100
Louisiana.....	18	98
Texas.....	58	107
Arkansas.....	40	101
Tennessee.....	18	103

The average condition is not so high as last year, and is 96, while in 1878 it was 99. (See table.)

The stand is generally good; in South Carolina it is reported bad in some sections owing to cold, dry spring; consequently it is some two

weeks later than last year. In Georgia and Alabama the stand is good, but somewhat late; in fact all the Gulf States report the same cause—too much rain at planting time and too cool weather. Northern Texas, Arkansas, and Tennessee each report a good stand and favorable condition.

The following extracts from correspondence are given:

NORTH CAROLINA.—*Bertie*: Stand good, but small for the season. *Columbus*: Very poor stand; the result of a cold, wet spring. *Duplin*: Acreage slightly increased; stands well and in thrifty condition. *Iredell*: Backward, but weather favorable. *Wayne*: A fine stand throughout the county. *Bladen*: Came up well, but has been injured by wet weather and cool nights. *Greene*: Stand and condition good. *Halifax*: Acreage increased; plant vigorous. *Union*: Not so well advanced as at this time last year. *Edgecombe*: Condition very good; never saw a better stand. *Martin*: Looks now to be an average; stands well, except on a small area where there has not been sufficient rain. *Beaufort*: Stand and condition about an average; acreage unchanged. *Hertford*: Stand very good; condition average. *Wilson*: The plant healthy and growing well; stand good.

SOUTH CAROLINA.—*Barnwell*: Backward on account of late spring, and stand not uniform. *Beaufort*: Condition favorable. *Chester*: Plants healthy and growing fast; stand good, and fields generally clean from grass and weeds. *Fairfield*: Cold weather has retarded growth. *Georgetown*: Too small to form an estimate. *Oconee*: Planted quite late on account of cold, dry weather, but coming up finely. *Union*: Stand not good; grass making headway; greater area planted than last year. *York*: Acreage increased; condition good. *Chesterfield*: Not looking well; plants small, and stand affected by worms and cold spring. *Clarendon*: Stand generally good; some complaints of plants dying from excessive moisture, cold nights, and grass choking them out; late favorable weather has greatly improved the condition. Area increased about 15 per cent. *Lexington*: Looking very well and weather favorable to its growth. *Spartanburg*: Clean where any care has been taken. *Williamsburg*: Acreage slightly increased; stand low and condition bad.

GEORGIA.—*Baker*: Poor stand. *Berrien*: About two weeks late. *Brooks*: Growth retarded by cool, wet nights. *Dooly*: Wet, cold spring produced a bad stand, and caused much replanting; prospect rather unfavorable. *Forsyth*: Increased acreage. *Habersham*: Looking well. *Jackson*: Generally a good stand; looking well and free from insects. *Jones*: Slightly below an average condition; with continued favorable weather will soon reach 100. *McDuffie*: Fifteen days later than last year; stand not so good, but plants healthy and now growing rapidly. *Milton*: Good stand; plants strong and growing very fast. *Muscogee*: Stand defective in many places owing to heavy spring rains and subsequent cold weather: fifteen days late. *Troup*: Stand good and promising; acreage increased. *Wilcox*: Owing to heavy rains much replanting was necessary, making it about two weeks late; a great deal not yet chopped out. *Worth*: Small, but looks well. *Fulton*: The best stand ever had in the county; about eight days later than last year. *Jefferson*: Poor stand, owing to unfavorable weather. *Dodge*: Stand not good. *Lincoln*: The plant vigorous and healthy and stand generally good; condition slightly affected by heavy rains, but upon the whole up to a full average. *Pulaski*: Poor stand; heavy rains made much replanting necessary. *Stewart*: Plant strong and healthy and stand good, but crop ten days late on account of unfavorable weather during planting season; acreage unchanged. *Talbot*: Heavy rains after planting caused a poor stand and rendered some replanting necessary; the plants now look well and bid fair to do much better than was anticipated. *Wilkes*: Early planted seriously injured by heavy rain; late did much better and is now growing vigorously, weather being favorable for getting out the grass; cut-worms have been destructive in some sections. *Cathoun*: Doing very well with the exception of too much grass; acreage increased about 10 per cent.

FLORIDA.—*Suwannee*: Better stand, and prospect more flattering than last year. *Wakulla*: Condition a full average; area increased 10 per cent. *Columbia*: Looking badly; nights cold and rain needed; full area planted. *Gadsden*: Backward, but stand generally good; plant healthy but small for this season of the year; some complaint of lice.

ALABAMA.—*Clarks*: Plants small but stand generally good; too much rain to keep the grass down. *Crenshaw*: Two to three weeks later than last year, and poor stand in many places. *Coffee*: Plants not as large as usual at this season, and stand imperfect. *Conceh*: Looking well. *Greene*: Plants small but stand generally good. The season has been favorable for working and it is clean, and with warm weather will grow rapidly. *Macon*: Growing well but small, and two weeks later than usual. *Perry*: Two weeks late; weather favorable for working the crop. The army-worm is reported in the adjoining county (Dallas), and planters are apprehensive of its approach. *Wilcox*: In good condition; at least 10 per cent. better than at this time last year. *De Kalb*: Stand fine and in growing order; freer from insects than usual at this time; more fertilizers used this spring than ever before. *Lowndes*: The cotton-worm has made its appearance in this county.

MISSISSIPPI.—*Copiah*: Condition about 105; crop better worked and cleaner than ever before known at this season of the year, but plants rather small. *Grenada*: Acreage increased; stand good and plants doing well. *Jefferson*: Fifteen days later; acreage about the same, but condition 10 per cent. lower than last year. *La Fayette*: From ten to fourteen days late, but is now looking well. *Norube*: Reduced acreage and short crop in prospect. *Sharkey*: Acreage reduced; condition, 100. *Fazoo*: Nights warm and plants growing finely; ground in good order. *Bolivar*: Acreage about 87½ compared with last year: crop ten days late and condition low. *Choctaw*: Acreage unchanged; condition about 10 per cent. above average. *Hinds*: Backward, but owing to seasonable showers and other favorable conditions there is a good stand almost universally; plant looks healthy and is in a growing condition; well chopped out, free from grass, and soil in most excellent condition to promote rapid growth. The advance in price has stimulated production and there is an increased acreage. *Washington*: Stand good; plants in healthy condition and well cultivated, notwithstanding the "Kansas fever"; season remarkably favorable. *Calhoun*: Unusually late owing to unfavorable spring weather. *Clark*: Excessive rains, cold nights, and the "louse" have reduced the condition and affected the stand. *Lowndes*: Good stand, but condition slightly affected by excessive rain; if the present rain continues much longer it will still more reduce the condition and materially injure the crop, as it will be impossible to eradicate the grass and preserve the stand. *Madison*: Early planted injured by cool nights, but the stand is generally good; condition, 102.

LOUISIANA.—*Franklin*: Small increase in area; stand indifferent and quality inferior to last year, more especially in early planted; the plant is short, shrunken, and dried out to a considerable extent. *Richland*: Promising, but backward on account of too much rain and cold; present season favorable to cleaning or chopping out. *Union*: Unusually backward, the result of cool nights. *Saint Landry*: Very good. *Washington*: Season favorable and the plant looks well and promising; acreage fully one-tenth greater than last year, if not more.

TEXAS.—*Austin*: Backward and condition poor on account of drought; will fall considerably below an average unless we have favorable weather at once. *Bastrop*: Looking well where it is clean. *Bell*: Stand good and doing very well. *Comal*: Increased area planted. *Coryell*: Increased acreage on account of destruction of small grain. *Dallas*: The increased acreage is due to the low price of wheat and a partial failure of the crops, together with the recent advance in the price of cotton; condition about an average and stand good. *Houston*: Weather favorable and crop growing rapidly. *Mason*: At least double the area planted this season and looks very well. *Rusk*: Doing very well now, with a full average condition; rain needed. *Somerville*: About an average condition and some increase in acreage. *Waller*: Early planted unusually prom-

ising; late planted not good; weather quite favorable. Good authority reports that the genuine cotton-fly was seen a few weeks since in the upper part of this county. *Washington*: Acreage about 10 per cent. less than last year. Cold nights and very dry days have reduced the condition to about 10 per cent. below an average, and have also given the young plants the "sore-shin" and made them lousy, but they are improving under the present weather. *Williamson*: Acreage at least one-third greater than last year, and the plants, although small for the season, look quite promising; crop generally clean. *Young*: Condition about 25 per cent. above an average, and acreage fully 50 per cent. greater than last year. *Burnet*: Good stand and fields very clean; plants not yet suffering, but rain needed to insure a full crop. *Angelina*: Looks well, but is very late; acreage less than last year. *Bezar*: Stand good and clear of weeds and grass. *Hunt*: The plant looks vigorous and promising; stand good and acreage increased. *Nararro*: Materially injured by excessive rains when coming out of the ground; the growth was retarded and the plant is now infested with the louse (*Aphis*); the condition at present is not more than 75. *Upshur*: Good stand and fair growth; acreage increased about 15 per cent. *Travis*: Well advanced all over the county and still growing; free of weeds; early planted beginning to bloom.

ARKANSAS.—*Craighead*: Better than usual, with a slightly-increased acreage. *Crawford*: Good average condition; area increased. *Izard*: Not yet seriously injured by the dry weather, but stand rather poor in consequence of the ravages of cut-worms; well worked, and condition about 100. *Scott*: Under the influence of the present favorable weather the condition is very much improved, and is now a full average. *Desha*: Came up well, but stand affected by cool nights; ten to fifteen days late. *Independence*: Looking well and in good condition; early planted injured by cut-worms, which rendered much replanting necessary. *Marion*: Looking well and weather favorable to growth; acreage increased about 25 per cent. *Sebastian*: A good stand and very clean. *Grant*: In excellent condition and an increased area of about 10 per cent. *Howard*: In excellent condition and stand splendid. *Pope*: Thoroughly worked, looking remarkably well, and prospect for good crop excellent.

TENNESSEE: *Rutherford*: Increased acreage stimulated by the advance in price. Plants now in fine condition; scraping, chopping, and plowing progressing satisfactorily. *Gibson*: Acreage 10 per cent. less than last year, but the condition much better; stand good generally. *Henderson*: Condition good and growth vigorous; slight decrease in acreage. *Dyer*: Condition never better for this season of the year: acreage increased. *McNairy*: Damaged by cut-worms; increase of 10 per cent. in acreage.

OATS.

[ACREAGE.—The acreage sown in oats has decreased about 4 per cent. from last year. The decline is found in all the States except Massachusetts, Delaware, South Carolina, Georgia, Florida, Mississippi, Texas, Arkansas, Wisconsin, Minnesota, Nebraska, and California; these States maintain or increase their former area; the greatest enlargement, 10 per cent., is in South Carolina. Taking the different sections, New England falls off 3 per cent.; the Middle States, 9 per cent.; South Atlantic States, 1 per cent.; Southern Inland States, 4 per cent.; States north of Ohio River, 5 per cent. The trans-Mississippi States and Pacific States barely maintain their previous acreage.

CONDITION.—Our reports show a very inferior condition of oats in nearly all sections of the Union and all below average. The only States reporting full average or above are Vermont, 101; Rhode Island, 100; South Carolina, 104; Minnesota, 101; and Colorado, 102. The gen-

eral average of the country is 81 against 103 in June, 1878; of New England, 99; of the Middle States, 85; of the South Atlantic States, 92; of the Gulf States, 85; of the Southern Inland States, 68; of the States north of the Ohio River, 73; of the trans-Mississippi States, 88; of the Pacific States, 93.

The general complaint is drought, and in the South winter-killing. The cold and backward spring was unfavorable to vegetation in many States. In the West, insect injuries are complained of, especially grasshoppers, which have been very destructive in a few localities. All indications point to a yield greatly inferior to that of last year.

The following extracts from correspondents are given:

NEW YORK.—*Saratoga*: Affected by drought. *Broome*: Greatly reduced by drought. *Erie*: Benefited greatly by the late refreshing rain. *Fulton*: Backward; unfavorable spring. *Otsego*: Seriously affected by spring drought. *Wyoming*: Rather poor. *Schenectady*: Recent copious rains have greatly improved the crop.

NEW JERSEY.—*Mercer*: Heavy rains and cold late spring have reduced the average. *Warren*: Slightly increased acreage, with condition about 100.

PENNSYLVANIA.—*Clearfield*: Suffering for rain. *Cambria*: The crop will not exceed 50. *Fayette*: Crop must be very short; continued drought. *Indiana*: Late sown came up thinly; crop will be light. *Lawrence*: That sown in April barely showing on the ground; condition about 50. *Bucks*: Rather poor; cold, dry spring; decreased acreage, owing to an increased area planted in potatoes. *Butler*: Late warm rains indicate a full yield. *Venango*: Suffered very much from drought; very thin in places. *Adams*: Late, but looks well. *Blair*: More or less affected by drought. *Luzerne*: Backward, but good stand. *Monroe*: Suffering for rain. *Westmoreland*: Affected by extreme drought. *York*: Greatly benefited by late rain. *Lancaster*: About two weeks late; small crop indicated.

DELAWARE.—*Sussex*: Unusual drought; condition about 90.

MARYLAND.—*Worcester*: Looks badly for want of rain. *Calvert*: Poor, owing to severe open winter.

VIRGINIA.—*Campbell*: Looks badly. *Charles City*: Winter oats almost entirely destroyed by cold; spring crop suffering for rain. *Floyd*: Growing well, but late. *Greenville*: Fall sowing in many cases almost a failure; spring crop at present looks well. *Goodland*: Winter-killed. *Halifax*: Healthy. *Middlesex*: Winter oats badly injured by severe open winter; spring sowing by drought. *Hanover*: A protracted drought has reduced the condition about 20 per cent. *Lunenburg*: Nearly all winter-killed; the spring crop looks very well. *Montgomery*: Never knew a better stand; the season has been most favorable. *New Kent*: Winter crop almost a failure; the spring crop very good. *Orange*: affected by drought. *Princess Anne*: Backward on account of unfavorable weather during May. *Prince Edward*: Decidedly bad prospect, owing to cold open winter and dry spring. *Tazewell*: Backward on account of late spring, but improving under the influence of recent rains. *Chesterfield*: Shortened by cold dry spring. *Highland*: Rather poor. *Lancaster*: Greatly injured by drought. *Northampton*: The crop will be shortened by continued drought. *Patrick*: Badly winter-killed. *Loudoun*: Late, but outlook favorable. *Prince William*: Greatly benefited by late rains. *Rockingham*: Injured by drought.

NORTH CAROLINA.—*Duplin*: Late rains have caused material improvement in this crop. *Forsyth*: Small, but will be greatly improved by rain. *Gates*: Short crop, owing to severe winter. *Granville*: Fall sowed winter-killed; spring sowed promises well. *Iredell*: Severely injured by drought, but now improving. *Mecklenburg*: Injured by cold, open winter. *Transylvania*: Winter oats destroyed by severe cold; spring crop looks well. *Bladen*: Very promising. *Camden*: Growth backward, but stand

good. *Greene*: Injured by late severe frost. *Halifax*: Suffering from drought. *Jackson*: Below average, owing to unfavorable spring. *Martin*: Good. *Randolph*: Winter oats badly frozen out; the spring planted is about 10 per cent. above average. *Alleghany*: Quite promising. *Alexander*: Owing to late rains the prospect for a full crop of spring oats is excellent. *Beaufort*: Fall crop badly winter-killed; spring crop very good. *Wilson*: About an average crop in view and free from rust.

SOUTH CAROLINA.—*Fairfield*: The fall crop above average; the spring crop not so good. *Georgetown*: Late rains have caused it to fill better than was expected; the average will be 10 per cent. above last year. *Abbeville*: Looking well, and weather favorable. *York*: Acreage slightly increased, but condition impaired by drought. *Clarendon*: Increased acreage, and owing to favorable weather a very full crop is expected.

GEORGIA.—*Baker*: Below average. *Barton*: Suffering greatly for rain. *Brooks*: Headed well, but stand not good. *Catoosa*: About average. *Clarke*: Injured by cold and drought. *Dooly*: Backward and rather thin. *Forsyth*: Large area sown and fair prospect. *Jackson*: Looks well and a heavy crop evident. *Milton*: More promising than for ten years; a good rain will insure a very fine crop. *Troup*: Both fall and spring sowing very promising; above average. *DeKalb*: Fall sown winter-killed; the spring crop looks finely. *Henry*: Seriously affected by drought. *Whitfield*: Fall sown about three-fourths destroyed; spring crop cut short by drought. *Fulton*: Winter oats badly killed; spring crop encouraging. *Jefferson*: Rather promising. *Dodge*: Very short. *Columbia*: Greatly improved by late rains. *Hart*: Weather favorable and crop in good condition. *Schley*: Good stand and very promising. *Thomas*: Season fine; outlook good though crops late.

FLORIDA.—*Santa Rosa*: Condition very good. *Suwannee*: About 25 per cent. increase in acreage, but condition not as good as last year. *Wakulla*: Good, with acreage increased. *Columbia*: Crop mostly harvested in good condition; weather favorable. *Manatee*: An entire failure, owing to ruinous drought. *Taylor*: All destroyed by long and severe drought.

ALABAMA.—*Wilcox*: Not particularly good; affected by drought. *Calhoun*: Fall sown all winter-killed; spring sown suffering for rain.

MISSISSIPPI.—*Grineda*: Good; weather favorable. *Hancock*: Harvested well; acreage increased. *Noxubee*: Ripe and being harvested; above an average yield. *Yazoo*: Prospect encouraging. *Covington*: Good crop in prospect. *Carroll*: Generally good.

TEXAS.—*Grayson*: Suffering from continued drought. *Fayette*: Late crop greatly improved by timely rains. *Hunt*: Injured by drought. *Upshur*: Small crop, owing to drought. *Madison*: Injured by excessive rain. *Anderson*: Heavy flood has greatly reduced the condition. *Eastland*: Seriously injured by drought. *Menard*: Low condition; unusually dry season. *Travis*: Light rains in some localities have produced full average, but upon the whole the condition is low. *Taylor*: Acreage greatly increased. *Rusk*: Improved by late favorable weather.

ARKANSAS.—*Saline*: Indications favorable. *Independence*: Suffered from drought. *Sebastian*: Good stand, but crop will be small, owing to drought. *Stone*: Set back by drought. *Garland*: About one-fourth of a crop. *Howard*: Cut off about 20 per cent. by drought. *Baxter*: Cut short by drought. *Fulton*: Affected by continued drought. *Prairie*: Prospect excellent. *Blount*: Crop reduced by drought.

TENNESSEE.—*Cocke*: Badly frozen out. *Monroe*: Generally injured by cold. *Rutherford*: Looking well, and promises a good crop. *Gibson*: Looking very well. *Grain*: Seriously affected by severe drought, but free from rust. *Greene*: Acreage of winter oats increased about 25 per cent.; much of it frozen out. *Serier*: Suffering greatly for rain. *Smith*: Rain badly needed. *Unicoi*: Looking healthy, but rain generally needed. *Henderson*: Injured by drought. *McMinn*: Shortened by May drought. *Perry*: Full average. *Haywood*: Rain just in season to insure a fair crop. *Montgomery*: Doing splendidly.

WEST VIRGINIA.—*Brooke*: Need rain badly. *Grant*: Suffering for rain. *Hampshire*:

Improved prospects since the rain. *Mercer*: Too cool and dry for oats. *Monroe*: Very short. *Ohio*: Good rains may yet increase the crop. *Raleigh*: Look fair. *Wirt*: Very short; severely injured by April drought. *Cabell*: Seriously injured by April and May drought; cannot possibly make an average. *Braxton*: Cut short by drought. *Barbour*: Entire failure unless it rains soon. *Doddridge*: Very short. *Greenbrier*: Below average; injured by the drought. *Hancock*: Injured by drought. *Harrison*: Cannot make a full crop. *Monongalia*: Very short; drought. *Putnam*: Looks like a failure. *Roane*: Very short. *Wayne*: Seriously injured by drought. *Wetzel*: Hardly worth cutting.

KENTUCKY.—*Boone*: Almost a total failure unless it rains soon. *Lewis*: In some parts of county injured by drought. *Anderson*: But one rain in seven weeks; an entire failure. *Calloway*: Much below average; drought. *Carroll*: Entire failure unless it rains soon; mostly past redemption. *Crittenden*: Many fields not worth cutting. *Johnson*: Damaged by the drought. *Kenton*: Indications of an entire failure. *Lincoln*: Almost a failure; drought. *Meade*: Nearly ruined by drought. *Montgomery*: Continued drought caused low growth and short heads. *Shelby*: Indications of a failure. *Todd*: Looks well. *Livingston*: Damaged by drought. *McCracken*: Almost given up as lost until the recent rains commenced. *Scott*: Almost a failure. *Spencer*: Recent rains have improved the prospects. *Allen*: Injured by drought. *Bath*: Not half crop. *Ballard*: Injured by drought. *Carter*: A fair crop with speedy rain. *Payette*: Badly injured by drought. *Fulton*: Do not look well; injured by drought. *Grant*: Cut short by drought. *Henry*: Too far gone. *Nicholas*: Worst prospect we ever had. *Russell*: Very poor. *Woodford*: Cut short one-half by drought. *Owen*: Seriously injured by drought. *Trigg*: Injured by drought. *Oldham*: Very short.

OHIO.—*Ashland*: Injured by spring drought. *Allen*: Reduced acreage, owing to the low prices of past two years; crop retarded by spring drought. *Belmont*: Very unpromising. *Brown*: Injured by drought. *Athens*: Badly injured by drought. *Clinton*: Cold, wet spring prevented a full crop being sown; subsequent drought. *Carroll*: Just out of the ground; recent rains may make a moderate crop. *Coshocton*: Materially injured by drought. *Guernsey*: Cut short by drought. *Geauga*: Large acreage sown; retarded by drought. *Holmes*: Retarded by drought. *Huron*: Very short. *Jefferson*: Cut short by drought. *Knox*: Very poor prospects. *Licking*: Not promising. *Montgomery*: Retarded by drought. *Medina*: Short crop unless it rains soon. *Portage*: Very backward. *Preble*: Short. *Summit*: Small and backward. *Sandusky*: Not encouraging. *Finton*: Cut short by drought. *Union*: Short. *Washington*: Suffering for rain. *Lorain*: Increase in acreage; injured by drought; below average.

MICHIGAN.—*Clinton*: Looks badly; needs rain. *Genesee*: A little below average; drought. *Manistee*: Recent rains have improved appearances. *Muskegon*: Suffering for rain. *Wayne*: Just coming up; retarded by drought. *Washtenaw*: Did not come up well; light stand and small growth. *Charlevoix*: Injured by drought. *Tuscola*: Spring dry and cold; poor growth; on clay hills the seed failed to come up.

INDIANA.—*Adams*: Looks well. *Bartholomew*: Injured by drought; *Carroll*: Very backward. *Clay*: Owing to drought, very unpromising. *Decatur*: Seriously affected by drought. *Dearborn*: Almost ruined; doubtful if we get back our seed. *Floyd*: Very backward; needs rain. *Hendricks*: Cut short by drought. *Hamilton*: Very small. *Huntington*: Very poor. *Jefferson*: Short. *Knox*: Almost ruined. *Morgan*: Short. *Putnam*: Twenty-five per cent. short. *Owen*: May have a three-fourths crop. *Ripley*: Much injured by drought. *Tippecanoe*: Unusually short. *Wabash*: Short, owing to drought. *Warren*: Much improved by recent rains. *DeKalb*: Short. *Dubois*: Materially injured by drought. *Harrison*: Much injured by drought. *Pike*: Very low.

ILLINOIS.—*Brown*: Suffered very much by drought. *Bond*: Will be a failure unless it rains soon. *Crawford*: Damaged some by drought. *Cook*: Uneven and backward; cold dry spring. *De Witt*: Injured by the cold, dry spring. *Edgar*: Do not look well. *Fayette*: Almost a failure. *Ford*: Very short. *Greene*: Thin and short. *Johnson*: Injured by drought. *Kendall*: Injured by drought. *Kankakee*: Materially injured by

drought. *Logan*: Very poor. *McHenry*: Injured by drought. *Adams*: Suffering for rain. *Edwards*: Cut short by drought. *Ogle*: Injured by drought. *Livingston*: Do not look well. *Lawrence*: Do not look as if they would be worth cutting. *Lee*: Early sown, drilled in, look well, and give promise of fair crop; late sown put in the usual way are worthless. *Menard*: Short. *Madison*: Much injured and very short. *Macon*: Short. *Mason*: Retarded by drought. *Massac*: Very short. *Pulaski*: Injured by drought; on thin land almost a failure. *Perry*: Do not look as if they would be worth cutting. *Piatt*: Injured by drought. *Putnam*: Very short. *Shelby*: Half crop. *Sangamon*: Serious injury by drought. *Schuyler*: Cut short by drought. *Tazewell*: Short. *Winnebago*: Failure. *Woodford*: Injured by the drought. *Williamson*: Seriously injured. *Morgan*: Very short.

WISCONSIN.—*Door*: Suffered for rain. *Grant*: Improved since rain. *Jefferson*: Can hardly expect an average crop. *Polk*: Improved since the rain. *Racine*: Injured seriously by drought; some fields seeded a second time. *Winnebago*: Good promise. *Wood*: Look well. *Washington*: Very poor on the uplands. *Walworth*: Look bad; suffered by drought.

MINNESOTA.—*Anoka*: Prospects good. *Becker*: Excellent condition. *Fillmore*: Much below average. *Goodhue*: Injured by drought. *Houston*: Improved by recent rains. *Jackson*: Look splendid. *Le Sueur*: Greatly improved by recent rains. *Meeker*: Improved since rain. *Nicollet*: Improving since the rain. *Olmsted*: Prospects since the rain are good. *Rice*: Suffered from drought. *Ramsey*: Improving since the rain. *Rock*: Promising. *Steele*: Prospects decidedly favorable since the rain.

IOWA.—*Allamakee*: Backward; drought. *Cherokee*: Injured by drought and high winds. *Hardin*: Injured by drought; recent rains have improved the crop, but it will fall below average. *Henry*: Short. *Howard*: Late sown looks badly. *Johnson*: Injured by drought. *Kossuth*: Will be about an average crop. *Monona*: Very short; improved some since rain. *Marion*: Reduced acreage. *Muscatine*: Fair. *Mahaska*: Good prospects since the rain. *O'Brien*: Fair crop. *Polk*: Retarded by drought; some improvement since rain. *Pottawattamie*: Improved since rain. *Sioux*: Injured by young grasshoppers.

MISSOURI.—*Adair*: Quite short. *Ballinger*: Almost an entire failure; drought and cut-worms. *Benton*: Not worth cutting. *Bates*: Almost ruined. *Cooper*: Exceeding poor; heading at from four to eight inches. *Carroll*: Suffering for rain and injured by chinch-bugs. *Caldwell*: Badly injured by drought. *De Kalb*: Have not done well. *Dade*: Rain too late. *Howard*: About ruined by drought. *Jasper*: Ruined by drought. *Lewis*: Will hardly pay to harvest. *Lawrence*: Injured by drought. *Madison*: Entire failure. *Maries*: Suffering for rain. *Osage*: Seriously injured by drought. *Pulaski*: Injured by drought. *Platte*: About half a crop. *Polk*: Seriously injured by cold dry winds. *Phelps*: Fair crop if it rains soon. *Pettis*: Some fields too short to cut. *Saint Francois*: Will not make a quarter crop. *Stone*: Very short. *Shelby*: Quite short. *Vernon*: About half crop. *Worth*: Cut short by drought. *Wright*: Damaged by drought. *Ripley*: Very short. *Saint Charles*: Burnt up. *Crawford*: Very poor; many fields not worth cutting.

KANSAS.—*Douglas*: Seriously retarded by drought. *Elk*: Burning up. *Franklin*: Look splendid. *Johnson*: Very short. *Montgomery*: Heading very short; yield light. *Reno*: Looking bad; drought, high winds, and grasshoppers.

NEBRASKA.—*Adams*: Never better. *Clay*: Splendid. *Harlan*: Some fields turning yellow; not of sufficient height to determine the cause. *Pawnee*: Short; injured seriously; drought. *Washington*: Never looked more promising at this season of the year.

CALIFORNIA.—*Humboldt*: Look well; rank growth.

DAKOTA.—*Hanson*: Never better at this time of the year. *Lincoln*: Crop about ruined by drought and grasshoppers. *Yankton*: Grasshoppers are inflicting serious injury.

INDIAN TERRITORY.—*Pottawattamie*: A very severe drought has cut the crop short.

UTAH.—*Box Elder*: Very dry and suffering for rain. *Cache*: Looks fair; grasshoppers are not troubling them as much as they are the other grains. *Tooele*: Very short. *Utah*: Increase of acreage; grasshoppers have made their appearance and are destroying everything before them.

RYE.

The decrease in acreage of rye planted last fall was about 4 per cent. The condition for the whole country is low, and is 91. In New England the crop is reported as full average, but in New York, the largest producing State, the condition is very low, being only 80. In Pennsylvania the condition is 88. The Southern States report high averages, but the crop is a small one, except in Tennessee and Kentucky, where the average is about 90. The States north of the Ohio River and west of the Mississippi all report high conditions, except Missouri, Kansas, and Nebraska. (See table.)

BARLEY.

Like the other cereals, barley is in low condition; the general average is 85, while in 1878, for this month, it was 102. Very little is grown in the Southern States, and it is not often mentioned in reports from those States. (See table.)

The acreage shows some decrease in the four great producing States of New York, Wisconsin, Iowa, and California, which produce three-fourths of the entire crop; the percentage of acreage as compared with last year is 97.

CORN.

As this crop is not all planted in the northern latitudes on the 1st of June, returns of acreage are not made till the 1st of July. Many of our correspondents, however, send us voluntary notes which indicate a larger area in the Southern States. The season has been very backward, and the drought of April and the first of May was very detrimental. In the large corn-producing States north of the Ohio River and Kentucky, the complaints are widespread of failure to sprout; the seed of last year's corn seemed to be defective. In Missouri and Kansas the accounts are more cheerful, and the crop is reported in good condition generally. In the Gulf States there is reported an increased acreage and very favorable conditions.

CLOVER.

The acreage of clover does not show any material change, except a slight increase in New England, and a large increase in the Northwestern States. The cotton States show some increase of area, principally in North Carolina, Alabama, and Arkansas. The condition of the crop is very low in all the country, except the New England States and those bordering on the Gulf of Mexico. The drought of spring which was so universal was particularly injurious in the Western States, Minnesota alone making a favorable report.

FRUIT.

The prospect of a good fruit crop is very gloomy; the late frosts of a cold, dry spring were fatal in many regions.

APPLES.—The average is low in all the States, except New England, where the late spring retarded the bloom till the frosts were over. The crop in all the Atlantic States is, however, fair. In the Gulf States the yield will be about 50 per cent. of a crop. In the Western States, north of the Ohio River, the crop is below an average, but with a promise of a fair yield. Wisconsin and Minnesota, however, report a full yield.

PEACHES.—This crop suffered most severely from the frosts of May. In the Eastern States, and particularly those where the culture is a specialty, the crop is reported as good, but in the Atlantic States, below Virginia, the crop will be a failure. The Gulf States, except Texas, report the same disaster. In those States bordering on the Ohio River the failure is almost total, only a few localities reporting small crops. West of the Mississippi the crop was severely injured. California, however, reports a fair crop in most parts of the State.

Table showing the acreage and condition of the crops, &c., June 1, 1879.

States.	WINTER WHEAT.		WINTER RYE.		SPRING WHEAT.		BARLEY.		OATS.		CLOVER.		SPRING PASTURE.		APPLES.		PEACHES.		COTTON.	
	Average con- dition June 1.	Average con- dition June 1.	Average con- dition June 1.	Average con- dition June 1.	Average con- dition June 1.	Average con- dition June 1.	Average con- dition June 1.	Average con- dition June 1.	Average con- dition June 1.	Average con- dition June 1.	Average con- dition June 1.	Average con- dition June 1.	Average con- dition June 1.	Average con- dition June 1.	Average con- dition June 1.	Average con- dition June 1.	Average con- dition June 1.	Average con- dition June 1.	Average con- dition June 1.	Average con- dition June 1.
Maine.....	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106	106
New Hampshire.....	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103
Vermont.....	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84
Massachusetts.....	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98	98
Rhode Island.....																				
Connecticut.....	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96	96
New York.....	81	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
New Jersey.....	79	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94
Pennsylvania.....	87	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88	88
Delaware.....	95	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Maryland.....	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Virginia.....	82	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85	85
North Carolina.....	95	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97
South Carolina.....	108	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99
Georgia.....	112	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99
Florida.....																				
Alabama.....	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103	103
Mississippi.....	99	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Louisiana.....	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
Texas.....	72	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75	75
Arkansas.....	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86	86
Tennessee.....	89	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94
West Virginia.....	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81	81
Kentucky.....	89	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83	83
Ohio.....	91	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90
Michigan.....	93	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95
Indiana.....	103	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99	99
Illinois.....	93	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92	92
Wisconsin.....	94	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97	97
Minnesota.....	91	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94	94
Iowa.....	102	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95	95
Missouri.....	79	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80	80
Kansas.....	78	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84	84
Nebraska.....	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70	70
Colorado.....																				
California.....	90	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77	77
Oregon.....	100	105	105	105	105	105	105	105	105	105	105	105	105	105	105	105	105	105	105	105

DEPARTMENT OF AGRICULTURE.

SPECIAL REPORT—No. 13.

REPORT

UPON THE

CONDITION OF CROPS

JULY 1, 1879.



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1879.

REPORT OF CROPS, JULY 1, 1879.

NOTICE.—In consequence of many letters received by this department urging a more prompt publication of our Monthly Report, and of some unfavorable criticisms by the newspapers regarding what they are pleased to term our want of dispatch in the matter, we feel compelled to state, in our own justification—

1. That the Monthly Report is compiled from reports from our numerous correspondents, received after the 1st until the 12th of the month.
 2. That on the latter day we close the account, begin our calculation, and by the 15th are in condition to give a synopsis to the telegraphs.
 3. That as early as the 18th the matter in detail goes to the Public Printer; and that the delays there occurring are beyond our control.
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CORN.

ACREAGE.—As was foreshadowed in the June report, the area planted in corn shows an increase of 3 per cent. In the New England States the area does not differ materially from that planted last year. None of the Atlantic States show any great change except North Carolina, which reports an increase of 3 per cent. Of the Southern States, Arkansas shows the greatest gain, being, as compared with last year, 108. Tennessee increases 5 per cent. and Mississippi 4.

Of the States north of the Ohio River, Ohio and Indiana each show a decline of 3 per cent. in area planted, while Illinois shows an increase of 7 per cent. and Wisconsin 4 per cent.

The States west of the Mississippi River report large increases as compared with last year, Iowa being 104, Kansas 113, and Nebraska 118. (See table.)

CONDITION.—The average condition of the crop for the whole country on July 1 was 93; not so high as last year by 2 per cent. The returns from the New England States show low condition, resulting from a late spring and heavy frosts. The Middle States report a fair condition except some complaint of drought in Pennsylvania. The South Atlantic States, with the exception of North Carolina, all report a low condition. In fact the drought is almost universal in all the Gulf States. Texas has suffered most from this cause, and the condition of the crop is only 63. Arkansas, Mississippi, and Tennessee each report high condition, but not so high as at the same time last year. In Kentucky, Ohio, and Indiana there is great complaint of defective seed, consequently much corn had to be replanted, and the condition on July 1 was lower than the

previous year. In Illinois the reports are more favorable, and the condition is very high, being 107 against 87 in 1878.

In those States west of the Mississippi River, and where the increase of area planted was greatest, the condition is reported the highest, being 113 in Missouri against 98 last year for the same time; Iowa 107 against 93, while Kansas and Nebraska both show very high condition.

The following extracts from correspondents are given:

MAINE.—*York*: A few days late, but looking well. *Piscataquis*: Killed by frost in some places as late as 14th June; condition about 75. The growth of all crops retarded by cold. *Somerset*: About ten days late from cold. *Androscoggin*: Backward on account of cold and dry season; other crops similarly affected. *Oxford*: A good stand, but two weeks late.

NEW HAMPSHIRE.—*Carroll*: Small for the season, but time enough to make a good crop.

VERMONT.—*Lamoille*: Injured by frost on 8th June. *Rutland*: Frost late in May and early in June injured this crop, together with all other small grains. *Washington*: The average materially cut down by severe frost in June. *Chittenden*: Very small and backward, owing to cold, wet weather. *Windsor*: Backward, but has a good stand. *Caledonia*: Small and backward.

MASSACHUSETTS.—*Berkshire*: Planted late and growth has been retarded by cold weather; but the stand is good and promises well.

CONNECTICUT.—*New London*: Injured by late frost. *Hartford*: Although we had a late spring the crops now promise well. *Windham*: Season late and crop backward.

NEW YORK.—*Allegany*: Larger than at same time last year. June very favorable for all kinds of crops. *Genesee*: Late and unpromising. *Oswego*: Planted late; too soon to tell much about it. *Saint Lawrence*: Largely increased acreage; more planted this year than ever before. *Wyoming*: This with other crops is below average, owing to severe drought and frost in early June.

NEW JERSEY.—*Cape May*: Looks well, but needs rain. *Camden*: Injured by a severe hail-storm. *Warren*: Growing well; prospect for a good crop.

PENNSYLVANIA.—*Armstrong*: Greatly injured by cut-worm, rendering much replanting necessary. *Cambria*: Condition greatly impaired by drought. *Northampton*: The ravages of the grub have necessitated much replanting; but present condition good. *Berks*: Very promising. *Butler*: About three weeks late; but favorable weather during July will bring it up to standard. *Northampton*: Short for the season; weather too dry. *Beaver*: Nine-tenths of the crop had to be replanted; cause, excessively dry weather. *Cumberland*: About an average condition. *Indiana*: Generally injured by the grub-worm. *Lawrence*: Injured by June frost; average, about 75. *Tenango*: Injured by late frost. *Lycoming*: Affected by spring drought, but is now improving under the influence of late rains.

MARYLAND.—*Frederick*: Acreage reduced on account of low price. *Worcester*: Affected by drought during May and June, but late refreshing showers have brought it up to an average. *Caroline*: Looking well. *Carroll*: Short, but well set.

VIRGINIA.—*Campbell*: The present condition is about 80, but will be greatly improved by an early rain. *Fluvanna*: Backward, owing to unfavorable weather. *Greensville*: Suffering for rain. *Halifax*: Suffering greatly for rain; acreage increased in consequence of a failure to plant in tobacco. *Russell*: Very good, considering the dry season. *Sussex*: Injured fully 10 per cent. by drought. *Hanover*: Crop cut short by cold, dry spring, but now improving. *Orange*: Injured by boring-worms, but will yield an average crop. *Charles City*: Seriously injured by drought. *Rockingham*: Affected by continued drought, as are all other crops. *King and Queen*: Above an average condition, weather favorable, and general outlook good, and an improvement of times evidently ahead. *Essex*: Below last year's average, owing to protracted drought. *Amelia*: Condition reduced by drought, which greatly prevented the proper

working of the soil, now very hard. *Dinwiddie*: Below an average size, but it has been so well cultivated that I put the condition at 100, and it is in fine condition to grow when the rain comes. *Middlesex*: Affected by drought. *Prince William*: Good stand and well worked, but short. *Madison*: Season favorable for working, and the crop generally in growing condition, though much of it is small, owing to late planting and dry, cool weather.

NORTH CAROLINA.—*Columbus*: Not looking so well as usual at this time. *Darie*: In good condition, though needing rain. *Forsyth*: Small, but looking well; favorable weather in July will make a fine crop. *Pasquotank*: Looking remarkably well, but rain greatly needed. *Wayne*: Looking well at present, but needs rain. *Bladen*: Rather late and stand uneven, owing to cool, wet weather. *Martin*: Unusually good. *Tyrrel*: Affected by drought. *Union*: Injured by continued dry weather. *Wilson*: Slightly affected by dry weather, but generally good. *Alleghany*: Promising. *Green*: This and all other crops suffering for rain; it is greatly needed. *Macon*: Though rather short in consequence of a very dry season, it looks well, and farmers very hopeful generally. *Mitchell*: Never looked better. *Perquimons*: Promises well; much of the crop laid by. *Pitt*: Condition threatened by drought. *Gates*: Small, but looking well.

SOUTH CAROLINA.—*Greenville*: Suffering for rain; a drought is prevailing which has continued for nine weeks. *Clarendon*: Injured by drought. *Chesterfield*: Not good; nearly a failure on bottom lands on account of drought in June. *Georgetown*: Has suffered greatly from drought; the early planted will fall short 25 to 30 per cent. Future good weather will save late corn. *Horry*: A general complaint of cut-worms and an unusually destructive bug. The increased number of these pests is attributed to the unusual cold summer. *Laurens*: Late and small, and now suffering from a protracted drought. *Union*: The need of rain has seriously affected the crop. *Spartanburg*: Small, but looking well where it has been worked.

GEORGIA.—*Baker*: Small, but favorable weather during July will make an average crop. *Fannin*: Looking well, but needs rain. *Jasper*: Suffering for rain. *Jackson*: Looks well where it has been worked. *Jones*: Seriously affected by drought, and the condition will be further reduced unless we have immediate rain. *Troup*: The seasons have been favorable, and the crop prospects are good. *Walker*: Affected by drought. *Warren*: Small, and a good season will be required to make a fair crop. *Worth*: Best crop known. *Muscogee*: Suffering for rain. *Cobb*: Owing to dry weather it is small, but in a healthy condition. *Columbia*: Prospect bad. *Dodge*: Injured by severe drought. *Oglethorpe*: Upland corn is a failure owing to drought. *Telfair*: In some localities ruined by drought. *Wayne*: Suffering very much from drought, and also from a worm infesting the roots, which seems to locate near the surface of the ground. It is something new in this county. *Wilcox*: Small, and looks yellow for want of rain. *De Kalb*: Crops generally clean and growing finely. *Early*: Suffering from a terrible drought. *Gordon*: Looks well, but is injured somewhat by the drought. *Jefferson*: An unfavorable outlook. *Laurens*: Suffering from a severe drought. *Liberty*: Badly affected by drought. *Lincoln*: Has not done well since the heavy frost in April. The stand was at first fine, but the bud-worm and frost reduced it very much, many places requiring replanting. *Putnam*: Average cut down at least one-half by drought. *Stewart*: Very materially damaged by drought during June. *Wilkes*: Condition about 50; drought the cause. Other crops injured equally. *Carroll*: At present good, but needing rain. *Marshall*: In better condition than for years, though needing rain in some sections. *Holmes*: Badly injured by continued dry weather.

FLORIDA.—*Marion*: Injured by drought. The same will apply to all other crops in this county. *Taylor*: All crops seriously injured by drought, the most ruinous ever known in this county. *Wakulla*: Have never seen a more unpromising prospect, the result of unfavorable weather. *Alachua*: Suffering for rain; all crops affected by drought. *Columbia*: Injured by drought. Less rain during the past month than has fallen during the same period for eighteen years. *Leon*: Suffering for rain. *Madison*: The crop

cut short by drought and drill-worm. *Manatee*: The whole county has suffered severely from drought; an entire failure in the northwestern part. *Gadsden*: Seriously affected by protracted drought.

ALABAMA.—*Macon*: Not doing well; suffering for rain. *Concuh*: Looking well; about 10 per cent. above an average. *Crenshaw*: Below an average, owing to drought. *Perry*: Ten days late, but improving under present favorable season; increased acreage. *Shelby*: Season very favorable; and diligent farm labor, where judiciously applied, will be amply rewarded. *Clarke*: A good crop, but needing rain, *Corington*: Has been very promising, but is now suffering for rain.

MISSISSIPPI.—*Grenada*: Nearly a full average crop, but about 5 per cent. less acreage. *Fazoo*: Far below an average. The early planted was greatly retarded in growth by cold nights in May, while the stand was depleted by what is popularly known as the "bud" worm. *Carroll*: Suffering for rain. *Monroe*: Rain badly needed. *Tishomingo*: In remarkably fine condition. The same may be said of all our crops; and weather exceptionally favorable. *Wilkinson*: Unusually fine condition. *Corington*: About an average condition; nearly all crops full, but needing rain. *Jefferson*: Condition low; yield will be small; no rain since the 6th of June. *Kemper*: Acreage about equal to last year, but crop not so good, owing to wet spring and late planting. *Newton*: Up to the present the prospect has been good, but the crop is now suffering for rain. *Simpson*: Seriously affected by protracted drought; the early planted almost ruined. *Smith*: Above an average condition; the season has been a little dry, but favorable, and upon the whole a prosperous one. *Wayne*: Looks well at present, but will be injured if the dry weather continues. Crops are generally clean of weeds and grass. *Choctaw*: Fine condition, but needing rain.

LOUISIANA.—*Bienville*: Seriously injured by drought; in some localities it will be an entire failure without immediate rain. *Franklin*: Where rain has fallen copiously the crop is in excellent condition, but where drought has prevailed (in at least two-thirds of the parish) the reverse is the case. *East Baton Rouge*: Now being affected by protracted drought. *Saint Landry*: A favorable season up to date, but now being affected by drought. *Jackson*: The crop will be almost a failure, owing to eight weeks' drought.

TEXAS.—*Bastrop*: Cut short by continued drought; nine bushels per acre will be a fair average for the county. *Comanche*: Crops generally have suffered greatly from drought. *Coryell*: Entire failure except in bottom lands; destroyed by hail and drought. *Dallas*: Reduced by drought to about half a crop. *Polk*: Injured by drought; the late crop may make an average yield. *Rusk*: Injured about 50 per cent. by severe and continued drought. *Upshur*: Reduced 25 per cent. by drought. *Washington*: Almost a failure; everything burning up for want of rain. *Fayette*: Cut short fully one-half by dry weather. *Mason*: Drought since April has cut down the condition greatly. *Somerville*: Now doing better than was expected, due to cool weather. *Lavaca*: Rain will improve the late crop. *Wood*: Late crop saved by present rain; enough will be made to supply home demand. *Anderson*: Suffering from a nine weeks' drought, partially relieved during the past fifteen days by light showers. *Austin*: Almost a failure, owing to protracted drought; the driest year since 1860; but one general rain in three months. *Brazoria*: Condition low; unless we have rain in a few days crops will be cut very short. *Burnett*: A very poor prospect; cut down in places for the purpose of saving for fodder. *Collin*: The early planted damaged by May drought, the late will be good. *Grayson*: Looking finely under the influence of late rain. *Grimes*: Looking badly; ruined by nine or ten inches of rain in April, followed by seven weeks of dry weather. *Harrison*: Almost an entire failure; a large portion of the county has had no rain for eight weeks. *Kendall*: Absolute failure, as are all small grains; the most unfavorable season known. *Navarro*: The acreage is about equal to last year's, but the crop is cut short one-half by drought, which has continued since early in May. *Titus*: Cut short one-fourth by drought. *Waller*: All drying up;

many will not house sufficient to run them three months; the terrible drought still continues.

ARKANSAS.—*Lawrence*: Very fine condition produced by remarkably favorable season; splendid late rains. *Logan*: Unusually promising. *Lonoke*: A favorable season for all crops. *Sebastian*: From present indications the crop will be better than for years. *Crawford*: The early planted very much injured by drought; the late crop is now improving under influence of recent rains. *Drew*: Though late, is looking well, but greatly in need of rain. *Prairie*: Greatly injured by continued drought. Have just had a good rain, which will improve standing crops. *Ashley*: Suffering for rain. *Garland*: The early planted injured by drought, else had the condition reached 110. *Howard*: Good rains since the 21st June have brought up the condition amazingly. *Izard*: Thoroughly cultivated and in fine condition, owing to splendid rains since June 21. *Johnson*: Present condition flattering. *Miller*: Injured by excessively dry weather during May and June. *Pope*: The early planted has been injured 25 per cent. by drought. *Sevier*: This county injured upon the whole about 50 per cent. *Woodruff*: Weather favorable to the crop, which is about an average. *Bradley*: Early planted injured by continued drought, which has lasted since the 5th May.

TENNESSEE.—*Haywood*: In splendid condition, and from present indications will yield 20 per cent. above an average. The crop prospect generally is flattering. *Smith*: Never in better condition; season favorable for its cultivation. *Anderson*: Present condition above average. *Bedford*: Very promising where it has been worked well. *Blount*: Being seriously injured by drought. *Coffee*: Well worked and looking very favorably. *Decatur*: Very good. Present prospect for all crops better than for years, which will be insured by timely rains. *Knox*: Seriously affected by the last fifteen days' dry weather. *Bradley*: Clean of weeds and in better condition than usual, but small from effects of dry weather. It is now raining. *Davidson*: Not yet injured by drought, but needing rain. *DeKalb*: If the dry weather continues a few days longer it may spoil our fair prospect for a very large crop. *Fayette*: Very good, but needing rain. *Gibson*: Prospect very good; much better than usual. *Grainger*: Suffering from drought, but an early rain will insure a large yield, as there has been an increase of area planted. *Greene*: Affected by dry weather. *Henderson*: Unusually clear of weeds and grass. The favorable weather has rendered the cultivation of crops very easy. *Henry*: Acreage greater than last year and condition fine. *McNairy*: Small, but otherwise in splendid condition. *Rhea*: Has suffered but little from drought. *Robertson*: Looks well, but a bad stand. *White*: Very promising. *Rutherford*: Affected by drought except where well worked.

WEST VIRGINIA.—*Hardy*: Suffering for rain. *Preston*: Drought. *Marion*: Needs rain. *Tyler*: Backward; defective seed and drought; replanted. *Boone*: Replanted; defective seed and drought. *Braxton*: Increased acreage; below average; replanted. *Hampshire*: Promises a large yield. *Roane*: Small and uneven; replanted. *Cabell*: Very small; short crop; drought. *Monroe*: Average. *Putnam*: Uneven stand; planted three or four times. *Wetzel*: Very backward; cool dry weather.

KENTUCKY.—*Bracken*: Late; defective seed; replanted. *Clay*: Improved since rain. *Hancock*: Needs rain. *Fulton*: Looking well. *Kenton*: Bad stand and late; drought. *Lincoln*: Poor stand; drought. *Muhlenburg*: Good prospect. *Nelson*: Some fields injured by flood, followed by high winds. *Nicholas*: Poor stand; defective seed, and drought. *Shelby*: Improved by recent rains. *Breckenridge*: Fair prospect. *Elliott*: Healthy. *Henry*: Poor stand; unfavorable spring. *Jefferson*: Rain improved it. *Jessamine*: Poor stand and unfavorable prospects. *Lyon*: Full crop. *Graves*: Very fine. *Allen*: Poor stand; drought. *Anderson*: Backward, but promises well. *Bourbon*: Came up badly; replanted. *Boyd*: Very small but of good color; replanted. *Calloway*: Best prospect for ten years. *Cumberland*: Looking well. *Grayson*: Replanted. *Metcalf*: Needs rain. *Russell*: Prospects very bad; no rain since April. *Spencer*: Below average. *Union*: Never more promising. *Washington*: Poor stand. *Wayne*: Stands the drought well. *Woodford*: Moderate stand but late. *Bath*: Injured by drought; may make moderate crop.

OHIO.—*Logan*: Poor stand; defective seed, and drought. *Monroe*: Generally small; replanted; poor seed, and drought. *Noble*: Recent rains will improve it. *Pickaway*: Bad stand; drought, and defective seed. *Ross*: Poor; defective seed; drought; wire and cut-worms; three or four plantings. *Scioto*: Better than last year. *Trumbull*: Seriously injured by frosts and drought. *Allen*: Low average; poor seed and drought. *Coshocton*: Injured by drought. *Carroll*: Poor stand; defective seed, drought, and cut-worms. *Geauga*: Backward, but looks well. *Meigs*: Backward and uneven. *Montgomery*: Good prospects since rain. *Morrow*: Looks well since rain; some complaint as to defective seed. *Finton*: Bad stand; defective seed, and drought. *Lake*: Short; drought. *Licking*: Injured by drought. *Medina*: Recent rains will improve it. *Athens*: Backward; drought. *Guernsey*: Very unfavorable. *Adams*: Short; replanted; defective seed, cold weather, cut-worms, lice, &c. *Auglaize*: Bad stand; drought and poor seed. *Clark*: Drought. *Huron*: Small, but looks well. *Knox*: Poor stand; defective seed. *Portage*: A little below average. *Union*: Backward; cool weather and drought; some injury by grasshoppers. *Wood*: Uneven; came up badly. *Highland*: Very small; replanted. *Perry*: Came up badly; defective seed, cool weather, and cut-worms. *Holmes*: Backward; replanted; defective seed, and drought.

MICHIGAN.—*Clinton*: Injured by frosts and drought. *Barry*: Looks well. *Branch*: Uneven stand; defective seed and cut-worms. *Benzie*: Damaged by frosts on low lands. *Mason*: Very bad; injured by frosts. *Montcalm*: Very backward. *Muskegon*: Looks well. *Tuscola*: Stands even and clean, but not so large as some years. *Wexford*: Injured by drought and frosts. *Newaygo*: Generally light; some well-worked fields look splendid. *Kent*: Injured by frosts.

INDIANA.—*Franklin*: Uneven stand; feeble growth; poor seed, drought, and cut-worms. *Decatur*: Bad stand; drought and defective seed; hundreds of acres could not be prepared for planting. *Carroll*: Poor stand; drought and defective seed. *Floyd*: Recent rains will improve it. *Howard*: Poor stand; drought. *Noble*: Late but doing well. *Madison*: Difficult to obtain a good stand. *Bartholomew*: Backward and uneven; needs rain. *Harrison*: Poor stand; defective seed. *Jefferson*: Short, but color good. *Marion*: Second planting doing well. *Owen*: Small, but thrifty. *Pike*: Backward. *Wabash*: Replanted; defective seed. *Whitley*: Doing well. *Brown*: Backward; replanted. *Clay*: Bad stand; defective seed; replanted. *Dearborn*: Late, but looking well. *Warren*: Too much rain in June. *Huntington*: Short, but now growing fast. *Starke*: Never better.

ILLINOIS.—*Greene*: Doing finely. *Logan*: Thin stand; clear of weeds and looks well. *Tazewell*: Very uneven; replanted. *Jersey*: Best for years. *Carroll*: Best stand for many years. *Kankakee*: Poor; drought and defective seed. *Piatt*: Late; replanted; prospect for the largest crop in many years. *McLean*: Large increase over last year. *Sangamon*: Improved by recent rains. *Vermillion*: Best in five years. *Kendall*: Late; replanted; doing well. *Clark*: Small, but clean. *Cook*: Replanted. *Crawford*: Prospects for a large crop. *Hancock*: Never better; thousands of acres, heretofore wet and swamp lands, have a fine growth of corn. State will produce 300,000,000 bushels this year. *Jackson*: Uneven; replanted; drought. *Jefferson*: Best prospects for twenty years. *Livingston*: Small, but clean and healthy; promises a large crop. *Mason*: Poor stand; one-third missing. *Massac*: Fine. *Ogle*: Good stand and promising. *Whitesides*: Recent rains improved it. *Winnebago*: Looks well since rain. *Boone*: Backward, but doing well; not an average stand. *De Kalb*: Average.

WISCONSIN.—Early planted injured by frost; replanted. *Dunn*: Fine. *Sauk*: Injured by rain. *Richland*: Good stand, but weedy; wet weather. *Calumet*: Damaged by heavy frost, June 16. *Fond du Lac*: Retarded by cold weather in June. *Jefferson*: Promises full average. *Milwaukee*: Growth retarded by cold nights. *Racine*: Not as good as usual. *Trempealeau*: Retarded by cold nights. *Walworth*: Not so good a stand as usual. *Jackson*: Backward. *Outagamie*: Injured by frosts.

MINNESOTA.—*Kandiyohi*: Backward. *Ramsey*: Good stand, but small. *Isanti*: Growing rapidly. *Jackson*: Retarded by grasshoppers and drought. *Nobles*: Many

fields injured by young grasshoppers. *Fillmore*: Fair stand, but small. *Hennepin*: Backward, but in good condition. *Polk*: First planting killed by frost. *Pope*: Good stand; small, but doing well. *Rock*: Good, but weedy; five per cent. decrease in acreage. *Watonwan*: Never better.

IOWA.—*Calhoun*: Never had a more perfect stand; acreage increased one-fifth over last year. *Jackson*: Improved by recent rains. *Lucas*: Best prospect for years. *Tama*: Early: good, and free from weeds. *Henry*: Best prospects for six years. *Louisa*: Five per cent. better than last year. *Lyon*: Increased acreage, but a little backward. *Marion*: Very fine and clean. *Allamakee*: Never more promising. *Howard*: Prospects for the largest crop ever raised. *Jasper*: Nice and clean but backward. *Lee*: Never looked better. *Mahaska*: Never had such good prospects for a large crop. *Monona*: Will be the largest crop ever raised in this county. *Muscatine*: Good. *O'Brien*: Grasshoppers are at work. *Plymouth*: Injured by grasshoppers. *Pottawattamie*: Looking well.

MISSOURI.—*Cass*: Over average; best stand for years. *Greene*: Never had so good a prospect. *Macon*: Never better. *Platte*: Prospects for a large crop never better. *Warren*: Looks well. *De Kalb*: Never promised so good a crop. *Carroll*: Finest prospects ever known. *Davies*: Growing nicely. *Madison*: Good. *Moniteau*: Very promising. *Polk*: Finest prospects for years. *Putnam*: Never so good a prospect. *Shelby*: Fine; large acreage. *Saint Louis*: First planting looks well; second and third plantings very backward. *Adair*: Ten per cent. better than last year. *Buchanan*: Very fine. *Johnson*: Never looked so promising. *Knox*: Good. *Lincoln*: Very Fine. *Newton*: Backward, but looks healthy. *Nodaway*: Unusually fine. *Saint Charles*: Decreased acreage; replanted; drought; small but healthy. *Sullivan*: Good on uplands. *Taney*: Never better. *Vernon*: Largest crop ever raised in this county. *Worth*: Damaged by hail and rain. *Clay*: Never better. *Pulaski*: Never more promising.

KANSAS.—*Douglas*: Never more promising. *Leavenworth*: Excellent stand; best condition for five years. *Sumner*: Greatly injured by drought and grasshoppers. *Marion*: Looks well and remarkably clean; a little short on uplands. *Bourbon*: Improved since rain. *Franklin*: Never looked better. *Graham*: Increased acreage ascribed to immigration. *Johnson*: Splendid. *Montgomery*: Never more promising. *Rush*: Looks well. *Reno*: Never looked better. *Shawnee*: Best prospects for ten years.

NEBRASKA.—*Richardson*: Will be the largest crop ever raised. *Franklin*: Never looked better. *Antelope*: Very promising; acreage largely increased. *Clay*: Good stand; splendid prospects. *Hall*: Rain prevents cultivation. *Washington*: Never looked so promising.

COLORADO.—*Larimer*: Injured by cold nights; half crop in some localities. *Weld*: Injured by drought.

OREGON.—*Yam Hill*: Rains make it quite late. *Lane*: Backward and light.

WASHINGTON TERRITORY.—*King*: Late.

NEW MEXICO.—*Bernalillo*: Backward; injured by drought. *Mora*: Injured by drought. *Santa Fé*: Retarded by drought. *San Miguel*: Drought; some fields destroyed.

UTAH.—*Box Elder*: Retarded by drought. *Cache*: Damaged by late frosts; not as much damage by grasshoppers as expected. *Morgan*: Badly injured by grasshoppers. *Utah*: Reduced acreage; scarcity of water. *Kane*: Good, where there is sufficient water for irrigation.

INDIAN TERRITORY.—*Chickasaw*: Very good. *Cherokee*: Drought, and the so-called "permit law," prevented a full acreage being planted. *Choctaw*: Retarded by drought. *Seminole*: Failure unless it rains soon.

WINTER WHEAT.

The condition of winter wheat in the States, July 1, averaged 91 against 101 July 1, 1878. This is, however, a slight improvement upon the June

report, which made the average only 90. Our first returns for the season gave the average at 98 on the 1st of April. The drought of spring was but partially relieved in the West and South by genial rains. The quality of the crop, from incidental remarks of our correspondents not called for by direct inquiry, appears to be considerably better than last year. We inquire in regard to quality later in the season.

Of the different sections of the Union, the New England States average 99, an improvement of 5 per cent. since June 1. The conditions of growth during the last month were, on the whole, quite favorable.

The Middle States maintain unchanged their June average of 86. Drought, mildew, local storms, and the ravages of the Hessian fly greatly depressed the crop.

The South Atlantic States average 95 against 96 in June. Maryland and the Carolinas taken together are full average, and Georgia 8 per cent. above; but Virginia, the largest wheat-growing State of this section, falls 15 per cent. below. In the latter State there are complaints of winter-killing and drought. In Georgia, the abundance of the home crop has given the local mills ample employment, and has caused the importation of wheat from the North to cease almost entirely.

The Gulf States show the greatest falling off, averaging only 75 against 83 in June. Florida and Louisiana raise no wheat worth mention. The small crops of Alabama and Mississippi average high, the former 104 and the latter 89; but Texas falls from 83 to 66. In this State mention is made of the Mediterranean wheat as showing special vitality against the unfavorable growing conditions of the season. The chronic complaint is drought.

The Southern inland States average 98 against 88 in June. The injuries of the earlier part of the season from drought were repaired, to a great extent, by genial rains and better growing conditions generally. The short straw was found to bear, unexpectedly, heavy heads of plump healthy grain.

The mammoth wheat-producing section north of the Ohio River averages 101 against 95 in June, all the States except Michigan showing a marked improvement. Here, also, short straw did not indicate a declining condition. The quality generally is satisfactory.

West of the Mississippi the States maintain their June average of 89. Here, injuries by insects, drought, and local storms have continued through June and prevented the recovery of the crop from its previous injuries.

The Pacific States average 108. But a small proportion of the California wheat is locally classed as winter wheat, though probably all of it should be. It would be well to designate the crop by the season in which it is sown. What is now called winter wheat would then be called fall wheat. California wheat, sown mostly in the winter months, is the true winter wheat. In Oregon, winter wheat averages 112.

SPRING WHEAT.

The average condition of spring wheat is 91 against 106, July 1, 1878. It has been subject to the same disasters that depressed the condition of winter wheat. The northern New England States range nearly up to average. The few counties in New York which report this crop return a condition of 89.

Texas, the only Southern State producing spring wheat to any extent, averages but 61. The great spring-wheat States of the Northwest range from 92 to 96, but Iowa falls to 88 and Kansas to 68. California averages 92 and the small crop of Oregon 100. It should be remembered that the disaster to the spring wheat of last year occurred after July 1. If no such drawback be experienced this year, the growing crop will fully equal, if not surpass, the actual outcome of 1878. The following extracts from correspondents are given:

MAINE.—*York*: Promising. *Oxford*: Late but looks well.

VERMONT.—*Chittenden*: Early sown suffered much from drought during May.

CONNECTICUT.—*New London*: Affected by spring frosts.

NEW YORK.—*Genesee*: Has done well during the last month, but is too thin for a full crop. *Steuben*: Seriously injured by drought during the fall and unfavorable spring weather; no such a drought since 1854.

NEW JERSEY.—*Cape May*: Filling well. *Camden*: Damaged by hail-storm in some sections of the county on 5th June. *Somerset*: Heads large and well filled with fine grain. *Warren*: About three-fourths of a crop in the northern portion of county, while in the southern section not more than one-half.

PENNSYLVANIA.—*Armstrong*: Badly injured by the fly last fall; not more than 40 per cent. of an average yield. *Cambria*: Average unaltered, but condition reduced by drought. *Northampton*: Stands thin, but is apparently well filled and promising. *Perry*: Entirely destroyed in some sections by hail. *York*: Looking remarkably well; grain large and well formed, and quality better than last year. *Berks*: The blade affected by mildew, but it will not injure the grain. *Butler*: Mostly a failure. *Lehigh*: Suffered much from rust in some locations. *Northumberland*: Below average, but heads well filled; fly reported in some places. *Beaver*: Injured by the fly. *Cumberland*: Drought. *Indiana*: Light crops. *Potter*: In some localities full average, in others poor. *Tenango*: Backward, owing to unfavorable spring. *Bucks*: Heads well filled, but the late fall-sown stands thin. *Elk*: Thin and late, and some reported badly rusted. *Greene*: Turns out much better than was expected in the spring; quality very good. *Lycoming*: A good crop on low land. *Adams*: Ripened very suddenly and much of it reported light.

DELAWARE.—*Kent*: Harvested; a fair average yield and of good quality.

MARYLAND.—*Montgomery*: Yield and quality very fine; Fultz variety very largely sown. *Forcester*: Quality very good. *Calvert*: Grain small and somewhat shriveled. *Saint Mary's*: The crop has improved since June. *Carroll*: Splendid weather for harvesting.

VIRGINIA.—*Fluranna*: Has filled well on low ground where it was sown early. *Giles*: Winter-killed. *Greenville*: Needs rain. *Loudoun*: Generally harvested and the yield below average; quality good. *Russell*: Good crop. *Orange*: Greatly improved by late favorable weather; crop short, but of superior quality. *Charles City*: In some places affected by rust and the fly. *Spottsylvania*: Harvested in good condition; heads well filled and plump, but very thin on the ground. *King George*: Good on high ground, but on flats considerably winter-killed and affected by drought. *Franklin*: The quality has not been better for ten years; straw rather light. *Amelia*: Above average. *Augusta*: Thin but well headed and filled. *Dinwiddie*: Stands thin,

but grain plump and above average; good harvest season. *Gloucester*: Generally turning out very well, but not make a full crop. *Henrico*: Turning out well. *Middlesex*: Badly winter-killed; below average. *Prince William*: Yield below average, but quality full 100. *Brunswick*: Harvested about two-thirds of a crop. *Madison*: Harvested in good condition; straw light, but heads well filled and quality superior.

NORTH CAROLINA.—*Davie*: Harvested one week earlier than usual. *Forayth*: Yield good and grain fine. *Mecklenburgh*: Grain good; about three-fourths of an average. *Pasquotank*: Yielded well; remarkably clean; heads well filled. *Duplin*: About three-fourths of a crop; quality fair. *Tyrrell*: Good and free from rust. *Wilson*: An average crop, and saved in fine condition. *Yancey*: Affected by smut; would like to have a remedy. *Caldwell*: Yield about 90 per cent. *Cleveland*: Very light; about equal to last year. *Jackson*: Very fine crop; weather very favorable for harvesting. *Macon*: Yield better than anticipated, and quality good. *Perquimons*: The best crop for three years. *Alexander*: Saved in fine condition.

SOUTH CAROLINA.—*Clarendon*: An inferior crop, and a decrease of 8 per cent. in area. *Chesterfield*: Rusted badly in most localities. *Laurens*: Above an average. *Lexington*: Hardly average.

GEORGIA.—*Fannin*: A little spotted upon the ground, but ripe and well filled. *Winnett*: Very promising. *Jackson*: A better crop never harvested in this county. *Troup*: An excellent crop, better than for ten years; escaped the rust. *Upson*: The largest crop since the war; all thrashed and in excellent condition. *Walker*: The best crop since 1855. *Cobb*: The finest crop for twenty years. *Clayton*: Very good, the best crop for years; attributable to favorable season and careful preparation of land. As high as 30 and even 40 bushels per acre are reported on good land. *Gordon*: A fine crop both in quantity and quality. *Hart*: Fine crop and acreage much greater than ever before. *Milton*: Very good; fine grain and the largest yield since 1857. *Pike*: All harvested, and at least 30 per cent. above average. *Stewart*: Turning out fully as well as was anticipated. *Talbot*: All thrashed; yield good. *Carroll*: Free from rust and grain; very fine.

ALABAMA.—*Chambers*: About ten per cent. above average. *Crenshaw*: Very light. *De Kalb*: The crop since harvest has fallen below average.

MISSISSIPPI.—*Kemper*: Had it not been for the depredations of birds it would have been equal to the crop of last year.

TEXAS.—*Bastrop*: A short crop, owing to continued drought; about 6 to 8 bushels per acre. *Coryell*: Would have been above an average but for hail-storms. *Dallas*: Grain full and plump, but only half a crop. *Upshur*: Grain fine and heads well filled. *Mason*: Seriously affected by continued drought. *Wood*: The yield short, but the grain very fine and crop saved in excellent condition. *Burnett*: Yield about six bushels per acre. *Collin*: Almost a failure, except Mediterranean, which is a fair yield. *McLennan*: Better than was anticipated. *Rockwall*: The Mediterranean is the most successful variety raised here. *Titus*: Yield greater than last year, and quality 20 per cent. better.

ARKANSAS.—*Lawrence*: Not affected by dry weather; good rains now. *Logan*: About one-third of a crop, 4 bushels per acre. *Crawford*: Yield reduced 33½ per cent. by drought, but quality of grain very good. *Drew*: Yield small, but harvested without rust. *Fulton*: Thrashed and turned out better than was expected at last report. *Garland*: The condition is about 100, but the yield is short, owing to dry weather. *Izard*: In shock and threatened with injury from continued rains. *Pope*: About two-thirds of a crop; quality better than was at first supposed.

TENNESSEE.—*Haywood*: Nearly harvested and the finest for many years; free from rust and smut; good rains just when needed. *Monroe*: An unusually good season; no rust. *Smith*: Greatly improved since last report; quality very fine, but yield rather short. *Anderson*: The best in quality for many years, and secured in good condition. *Bedford*: Heads long and full and the grain fine, but it stands thin on level and bottom lands. *Blount*: About average; quality very good. *Coffee*: A great deal winter-killed, but what we have is excellent. *Knox*: Grain plump and

clean; selling at 80 cents per bushel. *Unicoi*: Straw short, but heads well filled with large plump grain; free from any disease, except smut in a few fields. *Bradley*: Yield slightly below expectation, but of very superior quality. *De Kalb*: Yield small, but quality most excellent. *Gibson*: A smaller area sown, but the grain very good and the yield a fair average. *Grainger*: The condition greatly improved; full crop of the very best quality. *Greene*: Secured in good condition and of fine quality. *Henderson*: Weather favorable for thrashing; quality of grain superior. *Lauderdale*: Yield light, from freezing in winter and inferior seed. *McNairy*: Yield small, but quality better than for years. *Rhea*: Gathered in good condition; grain fine; the best crop for ten years. *Robertson*: Quality very good. *Serier*: Heads well filled and yield better than expected. *Shelby*: All harvested; yield large and quality fine. *White*: Yield small, but quality good. *Rutherford*: Total yield of county 60 per cent. of that of 1876; average 20 per cent. less.

WEST VIRGINIA.—*Hardy*: Suffering for rain. *Preston*: Less injured by drought than any other growing crop. *Marion*: Severe drought. *Morgan*: Materially injured by the fly. *Doddridge*: Short and thin, but well filled. *Tyler*: Injured by drought. *Boone*: Fine. *Brazton*: Above average; grain excellent and plump. *Hampshire*: Twenty-five per cent. below last year. *Jefferson*: Harvested in fine condition. *Roane*: Short in straw but headed and filled beyond expectation; about 90 per cent. *Nicholas*: Thin on the ground, but well filled. *Cabell*: Best crop for years. *Gilmer*: Will yield well. *Marshall*: Average. *Monroe*: Better than expected. *Putnam*: Harvest unusually early. *Upshur*: Wonderful improvement during June. *Wetzel*: Full average yield and excellent quality. *Lincoln*: Unusually good.

KENTUCKY.—*Bracken*: Best ever known in the county. *Clay*: Favorable since rain. *Hancock*: Needs rain. *Lewis*: Best harvest in the Ohio Valley for years. *Logan*: Fair average; grain plump. *McLean*: Better than expected. *Crittenden*: Thin, but of excellent quality; harvested well. *Fayette*: Much below average, but good. *Fulton*: Damaged in shock by rain. *Harrison*: Fine grain. *Kenton*: Short straw, but excellent grain. *Lincoln*: Short straw and heads; grain large and plump. *Muhlenburgh*: Injured by drought. *Nelson*: Entire fields injured by heavy rains and high winds; harvested in good condition. *Nicholas*: Short straw and heads; grain fine. *Shelby*: On thin lands not worth harvesting; yield average on rich lands; injured by smut where sown after corn. *Elliott*: Below average. *Jefferson*: Short; drought. *Jessamine*: Light yield, but excellent grain. *Lyon*: Average; some smut. *Graves*: Thin, and straw short; best quality of grain. *Allen*: Better than last year. *Anderson*: A little over average. *Bourbon*: Improved. *Butler*: Harvested in good condition. *Calloway*: Not so good as usual. *Cumberland*: Medium yield; excellent quality. *Grayson*: Thin; did not stool much; drought. *McCracken*: Injured in shock by rain. *Russell*: Injured by rust; yield better than anticipated; Fultz averages from 12 to 16 bushels. *Spencer*: Yield below average. *Union*: Saved by timely showers; abundant yield; good plump grain. *Washington*: Good yield and quality. *Wayne*: Stood the drought well. *Woodford*: Light yield; excellent quality; no rust or smut or injury by insects. *Bath*: Excellent; more than usual yield.

OHIO.—*Hocking*: Best crop for years. *Miami*: Best crop ever harvested, except last year's. *Ross*: Early sown injured by the fly. *Scioto*: Good yield; grain plump; some fields injured by the fly. *Wyandot*: Short; drought. *Allen*: Drought; Fultz, Scott, and Clawson are the best varieties. *Coshocton*: Materially injured by drought. *Carroll*: Ready for harvesting; very thin. *Geauga*: Slightly injured by winter; crop fair. *Meigs*: Harvested well; short straw and heads, but full plump grain. *Montgomery*: Straw short; heads well filled; good yield. *Morrow*: Above average; short straw; plump grain. *Vinton*: Fultz wheat ahead of all others. *Lake*: Short; drought. *Licking*: Drought prevented stooling and caused short straw; good quality. *Athens*: Thin and short; heads well filled; excellent grain. *Guernsey*: Thin stand, but well headed. *Adams*: Headed and filled well; grain plump. *Clark*: Short in straw, but a full yield of plump grain. *Huron*: Better quality than last year. *Portage*: Average. *Sandusky*: Thin; drought. *Sandusky*: Abundant yield; harvested in extra good con-

dition. *Wood*: Stands well and finely filled. *Highland*: Average; except in south half of county injured by drought and the fly. *Butler*: Short straw, but excellent grain. *Perry*: Short; drought.

MICHIGAN.—*Clinton*: Looks well. *Wayne*: Improved since rain. *Barry*: Ready for harvest. *Branch*: Rather above average; excellent grain. *Gratiot*: In west part of county looks as well as last year; heads large and filling well. *Mason*: Some fields not worth cutting. *Montcalm*: Never better. *Muskegon*: Straw short and turning yellow around the roots. *Wexford*: Injured by frosts and drought. *Newaygo*: Thin but well headed.

INDIANA.—*Franklin*: Increased acreage; ripened well; good quality and yield. *Gibson*: Never better; yield of this county about 1,000,000 bushels. *Decatur*: Improved since rain. *Floyd*: Better than last year. *Howard*: Largest acreage ever sown; berry unusually large; yield as good if not better than in 1864. *Noble*: Prospects for a heavy crop. *Shelby*: Harvested; best yield for years. *Bartholomew*: Best crop ever raised in the county, both in quality and quantity. *Harrison*: Harvested in good condition; excellent quality. *Jefferson*: Shortened by drought; splendid grain. *Knox*: Full average. *Marion*: Good yield and excellent quality. *Owen*: Best crop for many years. *Pike*: Fultz wheat has outdone itself this year. *Steuben*: Good as ever raised. *Wabash*: Best filled in ten years. *Whitley*: Best for years; short straw but excellent grain. *Brown*: Harvested in good condition; grain excellent. *Clay*: Good. *Dearborn*: Injured by drought. *Warren*: Winter wheat never better.

ILLINOIS.—*Greene*: Headed out well, but very short on thin land. *Tazewell*: Fall wheat looks fine; large growth and good color. *Cumberland*: Injured considerably by the Hessian fly. *Jersey*: Nearly harvested; heads well filled; grain of good quality. *Clinton*: Better than last year. *Piatt*: Winter wheat fine in quality as ever raised; some fields a little thin on ground. *Vermillion*: Best crop ever raised here; very large acreage. *Wayne*: In some localities entirely ruined by chinch-bugs. *Clark*: Splendid crop. *Crawford*: Short and thin; heads well filled; grain plump. *Hancock*: Harvested in best condition; clean straw; plump grain. *Jackson*: Yield about same as last year; excellent quality of grain. *Jefferson*: Grain plump and fine. *Livingston*: Small acreage of winter wheat, but of good quality; drought and chinch-bugs have made spring wheat almost a failure. *McHenry*: In some early fields appearances of rust. *Mason*: Winter wheat well filled; drought and chinch-bugs have made spring wheat almost a failure. *Ogle*: Winter wheat very good, but a small acreage; silver chaff has a fine appearance; spring wheat not so good. *Putnam*: Winter wheat killed by wind and hail storm June 4. *Winnebago*: Spring wheat has a fine growth, but shows appearances of rust and young chinch-bugs. *Adams*: Best yield from amount of straw ever known. *Boone*: Small acreage of spring wheat and rusting badly.

WISCONSIN.—*Sheboygan*: Looks fair but grain small; spring wheat backward but prospering. *Richland*: Some rust on winter wheat. *Douglas*: Poor success with winter wheat. *Calumet*: Injured by frost June 16. *Fond du Lac*: Spring wheat short in straw and heads. *Jefferson*: Promises full average. *La Crosse*: Light in straw and badly affected with rust. *Milwaukee*: Spring wheat promises a good crop. *Racine*: Very good. *Trempealeau*: Improving. *Walworth*: Usual acreage and average condition. *Jackson*: Short.

MINNESOTA.—*Kandiyohi*: Extra thick and strong; best prospects for years. *Ramsey*: Heading out; strong straw; wild buckwheat will injure it some. *Isanti*: Heading nicely. *Jackson*: Injured by grasshoppers and drought. *Carrer*: May be injured by rain. *Clay*: Short straw; fair heads. *Fillmore*: Backward. *Hennepin*: Early-sown spring wheat looks very fine. *Polk*: Injured by frost and drought. *Pope*: Improved rapidly since rain; lodging some on rich clay lands. *Rock*: One-fourth of spring wheat eaten by grasshoppers; balance in fine condition. *Sherburne*: Thin but looking well; half crop on old fields. *Waseca*: Improved since rain. *Watonwan*: Injured by rust and drought. *Yellow Medicine*: Looks well but thin on ground; decreased yield. *Le Seuer*: Rain-storm caused some lodging. *Wadena*: All danger past except from rust.

IOWA.—*Calhoun*: Light straw but well headed. *Jackson*: Improved since rain. *Johnson*: Many fields of spring wheat will not be harvested; drought and chinch-bugs; some plowed up and planted to corn. *Lucas*: Good. *Tama*: Spring wheat a little thin, but promises fair crop if chinch-bugs do not increase. *Emmet*: Looks well. *Henry*: Spring wheat retarded by drought. *Louisa*: Spring wheat a little thin and short. *Lyon*: Hundreds of acres destroyed by grasshoppers and fields planted to corn. *Marion*: Moderate yield of the best quality of winter wheat; spring wheat about average; filling well; chinch-bugs in some fields. *Montgomery*: Some fields of spring wheat nearly destroyed by chinch-bugs. *Allamakee*: Small acreage of winter wheat but looking well; early-sown spring wheat full average; late-sown weedy and injured by chinch-bugs. *Appanoose*: Looks well since rain. *Fayette*: Poor prospects; wet and warm weather and chinch-bugs. *Howard*: Spring wheat badly rusted; chinch-bugs causing some alarm; some winter wheat tried last fall and looks well. *Jasper*: Well headed but thin; no damage by insects. *Lee*: Good as ever harvested. *Mahaska*: Winter wheat harvested well; spring wheat very fine. *Muscatine*: Fall wheat very fine; spring wheat thin; short crop. *O'Brien*: Grasshoppers are at work. *Plymouth*: Small grains almost destroyed by grasshoppers. *Pottawattamie*: Looks well. *Sioux*: About destroyed by grasshoppers.

MISSOURI.—*Vernon*: Some injury by chinch-bugs. *Caldwell*: Many fields plowed up and planted to corn; balance badly injured by chinch-bugs. *Cass*: Nearly an average crop; splendid quality. *Greene*: Thin; well headed and of good quality. *New Madrid*: Winter wheat improved since rain; above average. *Phelps*: Early-sown winter wheat, a large yield of excellent quality; late sown very poor. *Platte*: Full half crop; grain large and plump. *Christian*: Better yield than expected. *De Kalb*: Heavy rains retard harvest. *Carroll*: Harvest retarded by rain; good quality but not quite average yield. *Daviess*: Recovered some since rain. *Madison*: May suffer injury in shock. *Moniteau*: Injured by drought and hail; average yield and choice quality. *Polk*: Winter wheat full average; thin but well headed. *Putnam*: Prospect never so good. *Shelby*: Very light. *Adair*: Good average. *Bates*: Almost average; heads well filled; grain plump. *Benton*: Short straw; large well-filled heads. *Buchanan*: Injured by drought; too much rain now. *Cedar*: Injured by red rust and drought. *Dent*: Injured in shock by rain. *Franklin*: Good harvest; grain plump and excellent. *Gentry*: Excellent winter wheat. *Grundy*: Injured by wet weather. *Iron*: Some damage in shock by rain. *Johnson*: Short and thin but heavily headed. *Livingston*: Injured in shock by rain. *Newton*: Many fields thin; others injured by rust. *Perry*: Sprouting in shock. *Sullivan*: Good on uplands. *Taney*: Average.

KANSAS.—*Douglas*: Good quality of winter wheat; yield about 10 bushels per acre. *Leavenworth*: Exceedingly irregular; breadth sown will not supply the deficiency in yield by 15 per cent. *Mitchell*: Drought and hail have almost destroyed small grain. *Nemaha*: Injured by drought and hail; now being injured by rain. *Sumner*: Greatly injured by drought and grasshoppers. *Marion*: Spring wheat about an entire failure. *Ottawa*: Harvest delayed by rain. *Franklin*: Short but well headed. *Graham*: Increased acreage, ascribed to immigration. *Johnson*: Thin on ground; heads well filled; plump grain; danger of sprouting in shock. *Montgomery*: Drought caused a decreased yield. *Reno*: Many fields destroyed by hail-storm of April 30; others too thin to cut; grasshoppers ruined considerable spring wheat. *Washington*: Extra good.

NEBRASKA.—*Franklin*: Spring wheat fair crop; fall wheat light, did not come up well. *Lancaster*: Grasshoppers getting thicker every day. *Antelope*: Injured by grasshoppers; some rust. *Cedar*: Severe injury by grasshoppers. *Clay*: Winter wheat thin, but excellent quality. *Gage*: Chinch-bugs at work on spring wheat. *Pawnee*: Many fields will not be cut; badly injured by chinch-bugs.

COLORADO.—*Larimer*: Spring wheat doing well; *Weld*: Short; drought.

CALIFORNIA.—*Humboldt*: Crops of all kinds never promised better; in one locality some destruction by chinch-bugs. *San Joaquin*: Not well filled; considerable blight caused by insects. *Placer*: Better crop than last year. *Santa Clara*: Late sown failed

to mature; six-tenths cut for hay; early sown, half crop. *Yuba*: Ten per cent. better than last year. *Stanislaus*: Considerably shriveled; two-thirds average.

OREGON.—*Marion*: Very wet season prevented some bottom lands from being sown; crop will average more than any previous year. *Umatilla*: Fine crop. *Clatsop*: Extra nice. *Linn*: Winter wheat rank growth; above average yield; upland spring wheat is above average. *Yam Hill*: Splendid. *Lane*: Heavy growth; prospects flattering.

DAKOTA.—*Bon Homme*: Injured by drought and grasshoppers. *Fankton*: Used up by grasshoppers.

UTAH.—*Box Elder*: Retarded by drought. *Cache*: Injured by late frosts; destruction by grasshoppers not as great as expected. *Kane*: Materially injured by drought. *Morgan*: Half destroyed by grasshoppers.

NEW MEXICO.—*Bernalillo*: Backward; injured by drought. *Dona Ana*: Good quality and yield. *Mora*: Half did not come up; poor stand; drought. *Santa Fe*: Retarded by drought. *San Miguel*: Some fields entirely ruined; drought.

WASHINGTON TERRITORY.—*Thurston*: Early-sown winter wheat never looked better; spring wheat less favorable. "Mold's Red" looks well, and promises to be a valuable acquisition. *San Juan*: Very much injured by excessive rains.

INDIAN TERRITORY.—*Chickasaw*: None planted; too dry for fall plowing. *Cherokee*: Small acreage; drought. *Choctaw*: Injured by drought. *Seminole*: Headed out six inches from ground; but little harvested.

COTTON.

The returns to the department indicate that the condition of June has not been maintained. The average condition of the whole cotton belt is 93. The State averages for July, as compared with the averages of the last two years, are as follows:

States.	July, 1877.	July, 1878.	July, 1879.
North Carolina	88	81	104
South Carolina	87	104	81
Georgia	90	105	86
Florida	95	100	91
Alabama	94	102	96
Mississippi	93	98	92
Louisiana	102	95	93
Texas	94	106	90
Arkansas	94	91	103
Tennessee	96	98	101
Average condition	93	99	93

The condition in the different States, as compared with the returns for the month of June, is as follows:

States.	June.	July.	Gain.	Loss.
North Carolina	98	104	6	.....
South Carolina	94	81	.....	13
Georgia	93	86	.....	7
Florida	95	91	.....	4
Alabama	96	96	.....	.....
Mississippi	99	92	.....	7
Louisiana	95	93	.....	2
Texas	94	90	.....	4
Arkansas	100	103	3	.....
Tennessee	94	101	7	.....

Showing that only three States—viz, North Carolina, Arkansas, and Tennessee—had improved their condition, while all the others had fallen

off. The drought, which was very severe, was the cause of the decline. In South Carolina, Georgia, and Texas its effects have been felt the most. In Mississippi the reports from Holmes and Yazoo Counties represent lice as very destructive.

The stand of cotton, however, for the whole belt is good, and is reported as well worked and free from grass; it is some two weeks late, as compared with last year. Other insect injuries are not reported to any extent, except in a few localities in Texas. The following extracts from correspondence are given:

NORTH CAROLINA.—*Mecklenburg*: Cotton suffered in some sections from want of working; where well worked looks promising, and at present the crop is equal to same time last year. *Pasquotank*: Looks remarkably well; rain is much needed. *Cumberland*: Looks better than any other crop; has not rained for seven weeks. *Gaston*: Rain-fall for the last four months has been unusually light; weather, however, has been favorable for the working and growth of cotton. *Martin*: Prospects very good. *Bladen*: Warm weather is improving the cotton. *Camden*: The severe drought has not affected cotton. *Duplin*: Unusually small for the season; clean, healthy, growing well, and another month of favorable weather may put it above an average. *Tyrrell*: Injured some by lice. *Wilson*: Prospect very good; plants healthy and fields clear of grass. *Cleveland*: More attention paid to cotton, owing to use of commercial fertilizers, which enables farmers to grow it in this county. *Greene*: Suffering from drought. *Perquimans*: Good prospect; stands excellent and healthy. *Pitt*: Drought threatens damage to the crop. *Gates*: Promises well, if not cut short by dry weather. *Edgecomb*: Stand very good and clean; severe drought.

SOUTH CAROLINA.—*Greenville*: Cotton still growing, and looks well where it has had proper cultivation. *Colleton*: Season very hot and dry, but good for cotton, which glories in hot dry weather. *Clarendon*: Three per cent. increase and growing finely. *Horry*: Unusual cold spring and summer, and June drought makes crop backward; weed looks well and had its first bloom June 22; acreage 20 per cent. increase over last year. *Laurens*: In better condition, but small and late and needing rain; well cultivated and labor working satisfactory. *Lexington*: Looking very well, but the drought is beginning to tell on it; unless we have rain soon crop cannot reach an average. *Union*: Plant in a healthy condition, and crop unusually clear of grass. *Chesterfield*: Good, in spite of bad stands generally. *Spartanburg*: Small, but where well worked gives good promise. *Edgefield*: Prospect gloomy; terrible drought, cool nights and cold east winds.

FLORIDA.—*Hamilton*: Injured some by drought. *Marion*: All crops have been injured by drought, but cotton is doing better than the others. *Leon*: Stands bad, small, and uneven owing to cold nights and heavy rains in April and May. *Georgetown*: Small; but good seasons may bring it up to average. *Madison*: Small, but healthy and growing; no caterpillars as yet. *Jefferson*: Injured by an unprecedented drought; unusually small and two or three weeks late, except upon manured land. *Gadsden*: Promises well although ten days later than last year.

GEORGIA.—*Forsyth*: Condition a full average; there will be blooms on most farms by July 1; usually it is the 8th or 10th before most of the farms have cotton blooms. *Gwinnett*: Better stand than usual; first bloom June 24, earliest ever known here. *Harris*: Cold winds have somewhat injured the cotton prospects. *Jasper*: Severe drought prevailing; cotton may hold out a few days longer. *Jackson*: Prospects not as good as usual. *Jones*: No rain for eight weeks. *Warren*: Small, and twenty days late, but doing well, and plenty of time to make if we get rain. *Worth*: Cotton good. *Brooks*: Stand not good but growing finely. *Muscogee*: Suffering from dry weather. *Cobb*: Small, but in healthy condition. *Dodge*: Growing slowly on account of drought. *Wilcox*: Small and very poor. *Clayton*: Very small, but has been well worked and

only needs rain to cause rapid growth. *Early*: Only two and a half inches of rain since May 22. *Hart*: Acreage one-third more than last year, and an increased use of fertilizers; crop fine, with first bloom on June 13, which is remarkable for this section of the country. *Jefferson*: Outlook unfavorable; nights too cool for cotton, and no rain. *Laurens*: Drought has not as yet injured cotton, but labor is on the decrease, and it is almost impossible to get help by the day. *Milton*: Forming very early and heavy; more forms than usual, and with a favorable season the yield will be a good one. *Pike*: Below average; less rain than ever was known in this county up to this date. *Putnam*: No rain; but cotton has a chance to make yet with a good season. *Talbot*: Plants small, very lousy, and at least two weeks behind last year. *Gordon*: Looks well. *Lincoln*: In fair condition considering the dry weather of May and June; early planted well developed but beginning to feel the drought; that planted since heavy rains of April retarded by dry weather in June; crop generally clean and well cultivated. *Pulaski*: Bad stands on account of heavy rains just after planting, and from injury in trying to clear away the grass; crop will be late; first bloom June 16 against May 27 last year. *Stewart*: Clear of grass and in good condition, but the plant is small and ten to fifteen days later than last year. *Wilkes*: No rain, and crop almost at a standstill. *Terrell*: Being injured by severe drought. *Carroll*: Good weed but backward; first bloom June 24.

ALABAMA.—*Baldwin*: Cotton prospects better than for several seasons; crops well advanced, clear of grass, and no sign of caterpillars. *Dale*: Later than last year; caused by too much rain; latterly a drought, and general scarcity of labor. *Macon*: Crops generally injured by drought; cotton stands hot and dry weather better than grain crops; labor good, and colored people working well. *Chambers*: Prospect flattering. *Conecuh*: Well grown; from eight to ten days earlier, and free from grass; more commercial fertilizers used this year than ever known since 1861. *Crenshaw*: Improved since last report. *Perry*: Ten days behind this time last year; no worms reported. *Barbour*: Caterpillars on some farms in this county; in this neighborhood attacked same localities as in previous years, and always cut out low, flat, and cold and first, fresh fields next, and old lands last, without regard to locality or proximity to places first attacked. *Clarke*: Stands good and clean, and give promise of a large crop. *De Kalb*: Past month cool and dry; very unfavorable to growth of cotton. *Saint Clair*: Small; weather too cool. *Bullock*: Two weeks later than last year.

MISSISSIPPI.—*Grenada*: Retarded some by cool nights; a full average crop anticipated. *Yazoo*: Plant never known to be so small at this season of the year; cool nights during May and extending into June, retarded growth and developed "lice"; grassy, owing to neglected cultivation. *Leake*: Cotton came up well, but, owing to cold rains in May and lice, was killed out, and is not now more than two-thirds of a stand; plant far behind last year in size. *Carroll*: Four weeks since we had rain, which will have a tendency to lower condition of cotton. *Monroe*: Labor working well and crops in good condition. *Simpson*: Two weeks later than last year; very small, but in pretty good condition. *Clark*: Bad stand and two weeks late. *De Soto*: Splendid season; crop in good order. *Jefferson*: Small but clean and fruiting. *Kemper*: Looks well, and promises a good crop. *Wayne*: Good and clean. *Holmes*: Lice have nearly destroyed the stand; "little and lousy" expresses it all; it is just now beginning to grow, when it should be making and even maturing its fruit. *Marshall*: Weed small, but crop in much better condition than for years past; early and healthy, and stands never better. *Amite*: Acreage not enlarged, but condition 10 per cent. better than this date last year.

LOUISIANA.—*Bienville*: Cotton will begin to fail if do not get rain soon. *Rapides*: Caterpillars reported to have been seen in several places in this parish. *Concordia*: Average height and size about same as last year, but the stand is very inferior: some well-advanced cotton that was planted very early may be the cause of creating the impression that the crop will be large and that all of it is well advanced. *Franklin*: Improved greatly during the past month: plant well formed and full of blooms. *East*

Baton Rouge: Drought beginning to affect the crop. *Saint Landry*: Everything favorable for a large yield. *Jackson*: Very good, as it stands drought better than any other crop.

TEXAS.—*Bastrop*: Looking well, but small under the most favorable circumstances, and cannot make over half a crop. Worms have made their appearance in several counties. If they strike us as early as July, we cannot make over one-fourth of a crop. *Comanche*: Late, but stand good; no worms yet. *Coryell*: Cotton replanted after storm of May 5 was devoured by worms as it came up, or else never sprouted. *Dallas*: Suffered from drought, but with good weather in July and August may be an average; in some sections have had good rains, and the crop is clear of grass and weeds. *Fannin*: Finest prospect for cotton we have ever had. *Hardin*: Dryest year since 1860; worms making their appearance. *Polk*: Gradually improving. *Rusk*: Is clean and looks well; no worms yet. *Trinity*: Late cotton suffering from the protracted drought. *Upshur*: Condition 20 per cent. better than last year. *Washington*: Does not show the effects of drought yet, as it is an air plant, but experienced planters say that with a good rain now many of the squares would shed off. No worms yet. Cotton is a risky and dangerous crop, because our farmers stake all on it instead of cultivating a diversity of crops. *Somerville*: The drought has been severe, but cotton has plenty of time to make, although the stalk is small, joints short, and squares thick. Seasonable rains will give us a fine crop. *Lavaca*: Remarkably small for its age, but full of bloom and not shedding. *Wood*: Never better for this season of the year. *Austin*: Dryest year since 1860. Cotton unusually small and very backward, except in favored localities where the soil is rich and moist. Notwithstanding the severe drought there are reports of the worm, and the seasons must be very favorable henceforth to give three-fourths of an average crop. *Burnet*: Has suffered but little from the drought, yet if we do not get rain within two weeks the crop will be smaller than it ever has been. *Collin*: Never promised better. *Comal*: Drought continues. The rain-fall in this locality has only been 7.55 inches since the 1st of January. *Grayson*: No signs of worm, and better cotton prospect than usual at this season of the year. *Grimes*: Cotton twelve to fifteen days later than last year on account of much replanting; healthy and bearing well, but needs rain. *Harrison*: Backward, owing to absence of rain for eight weeks in a large portion of this county. *Kendall*: Holds its own, although this is the dryest year in this district since 1849. *McLennan*: No rain since May 5. If favored with a rain during the next twenty days we can make a crop of cotton. *Rockwell*: Only crop that gives promise of a good yield. *Victoria*: Worms at work, but are being repulsed with Paris green; the long drought has ended. *Anderson*: No rain for nine weeks; cotton clean, well formed, and blooming and bolling finely. *Brazoria*: All vegetation affected by drought, but cotton the least. *Galveston*: No rain for several months. *Nararro*: Drought since May, and crop two to four weeks late; caterpillars in force in some fields. *Smith*: Doing well. *Titus*: Looks fine, but growth too large for season. *Waller*: The terrible drought still continues. Cotton, however, is growing and making finely. The worm did much good last year, but this year threatens the destruction of the crop. Rain does not seem to be essential to the development of the worm, as was thought. *Ellis*: Plants small, but well filled with forms and blooms; some bolls, and with rain may realize an average crop.

ARKANSAS.—*Lawrence*: Season has been of the most favorable for cotton. *Logan*: Extra good. *Sebastian*: Have not had a better prospect for years. *Desha*: Stand injured very much by lice and locusts; condition good; clean, and squares forming rapidly; blooms appeared about the 18th of June; presents a generally healthy appearance, except where stung by locusts; damage by insects, at least 10 per cent. *Drew*: On account of dry weather since May 6, cotton has been worked without loss of stand. *Prairie*: Better condition than I have ever known at this season of the year; bloomed ten days earlier. *Crawford*: Needs rain, but is in good average condition and healthy; stalk shorter than usual. *Fulton*: At this date truly promising. *Izard*: Drought at an end; and cotton thoroughly cultivated, and ground in perfect condition to receive the much needed rain. *Johnson*: Prospects seem to be flattering.

Little River: Suffering from drought; upland better in every way than that on the Red River bottoms. *Woodruff*: Spring favorable. *Grant*: Looks unusually well. *Scott*: Blooms two weeks earlier than usual; the best of growing seasons. *Marion*: Prospects never better. *Ashley*: Suffering from drought. *Howard*: Too much rain, which is detrimental to crop by promoting growth of suckers. *Arkansas*: Better than usual. *Woodruff*: Very good. *Bradley*: Never cleaner or better tilled; with good rains will be above an average.

TENNESSEE.—*Haywood*: Free from grass and in good growing order. *Henry*: Acreage increased fully 10 per cent.; plant small for the season. *McNairy*: Small, but looking well. *Serier*: Suffering from drought. *Gibson*: Less planted than usual; condition fine, though some damage is feared from rains and cool nights. *Rutherford*: Exceptionally good; blooms July 1 are considered early, but we had some on the 20th of June of this year.

TOBACCO.

ACREAGE.—The acreage of this crop compared with that of 1878 is placed, in Kentucky, at 89 per cent; in Virginia at 90; Missouri, 76; Tennessee, 95; Ohio, 75; Maryland, 96; Indiana, 70; North Carolina, 103; Pennsylvania, 112; Connecticut, 119; Massachusetts, 110; New York, 110; West Virginia, 73; Wisconsin, 123; South Carolina, 100; Georgia, 92; Alabama, 95; Mississippi, 100; Texas, 98; Arkansas, 80. The six last named States, and all others, as well as the Territories, grow so little tobacco as to still remain an unimportant factor in estimating the total product of the country.

The four States in which the bulk of the seed-leaf tobacco is grown (although Ohio and one or two other States north of the Ohio are increasing their product)—the four States of Connecticut, Massachusetts, New York, and Pennsylvania—show an increase of acreage of from 10 per cent. in Massachusetts and New York, each, to 19 per cent. in Connecticut. Pennsylvania planting largely in excess of the three other States combined, we have for the four an increase of about 13 per cent., or a larger acreage than that of 1877.

Of States producing *shipping, manufacturing, and smoking* tobaccos—tobaccos which constitute nine-tenths of all grown in the United States—North Carolina alone shows an increase in acreage over last year. All others indicate a material decrease from the acreage of 1878, which itself, as shown in our report for July of that year, was very much below that of 1877.

CONDITION.—The condition at this date for the whole country is slightly below that of July 1, 1878. Massachusetts alone of the States bordering on the Atlantic shows an improved condition over last year. Tennessee in the West places her condition at 94 against 89 last year.

OATS.

The condition of the oat crop shows no improvement since our June report; on the contrary, there is some decline. The New England States show a fair condition, but New York and Pennsylvania show a condition no better than in June. Virginia declines from 88 in June to 76

on July 1, caused by drought. The Carolinas, Georgia, and the Gulf States, although the amount raised in these States is small as compared with the more Northern States, all have fine crops for this year. Tennessee, Kentucky, and the States north of the Ohio River are all much below average on account of drought, Wisconsin being the only exception, where the average is 98. Minnesota, Iowa, and Nebraska report good average condition, but Missouri and Kansas are very low. (See table.)

RYE.

Winter rye is nearly a full average in New England, as also are the small amounts grown in the more Southern Atlantic and the Gulf States. In the Ohio Valley, West of the Mississippi River and on the Pacific coast, the condition is more or less depressed. Oregon averages but 79. Spring rye has a higher general average than winter rye, but is reported in a much smaller number of States. Its maximum condition, 103, is in Minnesota; its minimum, 55, in Oregon. Rye has been largely affected by the same influences that depressed the wheat crop.

BARLEY.

Barley is full average, or above; in New Hampshire, 101; Massachusetts, 100; Connecticut, 100; Georgia, 101; and Oregon, 108. In all the other States it is below average, the lowest condition, 69, being in West Virginia.

POTATOES.

ACREAGE.—There has been a decided increase in the area planted in potatoes, amounting to 3 per cent. for the whole country. The increase was largest in Pennsylvania, and was 9 per cent.; in New York it was 4 per cent. Maine, which is a large producer, shows no change from last year. The Southern States, from Maryland to Texas, show some decline, Alabama alone making an increase of 4 per cent.; Tennessee and Kentucky each fall off from 5 to 3 per cent. Of the States north of the Ohio River, none show a decline, and almost all make an increase. Michigan reports, as compared with last year, 107; Illinois, 104; Wisconsin, 104. In the West, Iowa reports 105; Missouri, 105; California and Oregon each make large increases.

CONDITION.—The condition on July 1 was very favorable; much better than last year. The drought was severe on the early-planted varieties, but the rains of June were very favorable in those States where the bulk of the crop is grown. In the New England States the Colorado beetle is reported as very destructive, and it is only by an incessant warfare that it is kept under. New York and Pennsylvania each report high condition and few insects. In all the States south of Delaware the drought is beginning to tell on the condition. North of the Ohio River and west of the Mississippi, all the reports are very favorable. Iowa reports 105.

SWEET POTATOES.

The acreage in sweet potatoes increased 11 per cent. in Maryland; 12 per cent. in Nebraska; 3 per cent. in California, and 15 per cent. in Oregon. In the other States it has fallen off, the decline ranging from 1 per cent. in New Jersey to 13 per cent. in Delaware and Florida. The condition is full average or above only in Maryland, 105; Iowa, 100; and Nebraska, 103. The other States are all below, ranging from 77 in Delaware to 99 in Missouri. Our correspondent in Larimer, Colo., states that this crop has always been a failure on the plains. California has increased her acreage in several counties.

FRUIT.

The condition of the fruit of the country shows no change since the June report. The weather had been favorable for those that had escaped the frosts of May. In all the North Atlantic States the crop is good; reports of some injury by frost in June in Vermont, and in New York and Pennsylvania some complaint of the fruit falling from the trees. The peach crop of Delaware, Maryland, and Virginia is very good. The South Atlantic States from North Carolina down and all the Gulf States report very poor condition, especially in peaches. Kentucky, Ohio, Indiana, and Illinois all report great disaster to the peaches and a low condition for apples. The Northern States in the belt comprising Michigan, Wisconsin, Minnesota, report good apple crop. The Pacific coast has a full average. (See table.)

WOOL.

By referring to the table at the close of this report, it will be noted that nearly all the States show an increased wool clip. The deficiencies are small and in States producing but a small proportion of the wool-clip, while the great wool-producing States of the West report very large increments. It is proposed, after the data of the tenth national census have been received, to give closer estimates of this vast and growing agricultural interest.

Table showing the condition, &c., of crops on the 1st day of July, 1879.

States.	CORN.		WHEAT.		RYE.	OATS.		POTATOES (Solanum tuberosum).		POTATOES (Batatas edulis), SWEET.		BEANS.	
	Average com- pared with last year.	Average con- dition July 1.	Average con- dition of winter wheat July 1.	Average con- dition of spring wheat July 1.		Average con- dition July 1.	Average con- dition July 1.	Average com- pared with last year.	Average con- dition July 1.	Average com- pared with last year.	Average con- dition July 1.	Average com- pared with last year.	Average con- dition July 1.
Maine.....	97	88				99	98	100	101			101	90
New Hampshire.....	101	93	99	100	102	100	98	100	99			101	97
Vermont.....	102	88	97	98	95	100	99	94	90			100	98
Massachusetts.....	110	94	100	101	100	101	100	113	102			100	100
Rhode Island.....													
Connecticut.....	102	96	100	97	95	99	98	104	104			102	97
New York.....	99	91	84	89	80	90	83	106	99			102	97
New Jersey.....	97	100	81	90	96	92	92	107	97			99	98
Pennsylvania.....	101	89	90	100	84	80	84	109	92			94	96
Delaware.....	100	90	97	100	93	90	80	90	82			100	97
Maryland.....	94	99	100	99	99	90	76	90	91			111	105
Virginia.....	101	95	85	96	96	99	76	90	96			90	91
North Carolina.....	103	107	101	103	103	99	99	90	96			93	98
South Carolina.....	98	88	94	94	101	101	101	100	99			90	91
Georgia.....	100	89	108	105	102	100	100	102	96			93	98
Florida.....	97	87	104	96	102	102	102	104	93			94	104
Alabama.....	104	100	99	99	99	100	100	93	97			93	102
Mississippi.....	99	81			99	95	95	94	94			94	90
Louisiana.....	100	93	66	61	83	82	82	92	87			71	79
Texas.....	108	94	92	98	96	88	88	90	87			90	99
Arkansas.....	105	97	90	96	96	79	83	93	83			101	93
Tennessee.....	106	88	84	84	92	72	83	93	90			102	95
West Virginia.....	100	89	97	77	77	82	88	97	83			98	97
Kentucky.....	100	80	98	91	97	82	88	100	94			98	98
Ohio.....	100	93	90	93	93	82	88	100	94			98	98
Michigan.....	107	93	108	83	99	77	84	107	95			100	100
Indiana.....	107	108	106	83	99	73	84	104	98			100	100
Illinois.....	104	92	97	96	96	90	98	103	100			97	100
Wisconsin.....	106	94	97	93	98	90	98	102	103			103	103
Minnesota.....	104	107	104	88	95	86	93	103	102			100	102
Iowa.....	108	113	94	93	94	76	94	103	100			98	98
Missouri.....	108	113	94	93	94	76	94	103	100			98	98
Kansas.....	118	107	76	92	87	90	84	107	100			112	103
Nebraska.....	110	94	100	91	86	82	91	94	94			103	98
Colorado.....	100	92	73	91	86	102	95	119	99			101	97
California.....	89	82	112	104	59	101	108	114	106			115	88
Oregon.....													

Table showing the condition, &c., of crops on the 1st day of July, 1879—Continued.

States.	SORGHUM.	SUGAR CANE (not sorghum).	TOBACCO.	CLOVER, TIMOTHY, PASTURE.	COTTON.	WOOL.	APPLES.	PEACHES.	GRAPES.
	Average com- pared with last year.	Average condi- tion July 1.	Average com- pared with last year.	Average condi- tion July 1.	Average condi- tion July 1.	Amount of wool in hundred weight.	Average condi- tion July 1.	Average condi- tion July 1.	Average condi- tion July 1.
Maine.....									
New Hampshire.....									
Vermont.....									
Massachusetts.....									
Rhode Island.....									
Connecticut.....									
New York.....									
New Jersey.....									
Pennsylvania.....									
Delaware.....									
Maryland.....									
Virginia.....									
North Carolina.....									
South Carolina.....									
Georgia.....									
Florida.....									
Alabama.....									
Mississippi.....									
Louisiana.....									
Texas.....									
Arkansas.....									
Tennessee.....									
West Virginia.....									
Kentucky.....									
Ohio.....									
Michigan.....									
Indiana.....									
Illinois.....									
Wisconsin.....									
Minnesota.....									
Iowa.....									
Missouri.....									
Kansas.....									
Nebraska.....									
Colorado.....									
California.....									
Oregon.....									

DEPARTMENT OF AGRICULTURE.

SPECIAL REPORT—No. 16.

REPORT

UPON THE ,

CONDITION OF CROPS

AUGUST 1, 1879.



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1879.

AUGUST REPORT OF GROWING CROPS.

COTTON.



The returns to this Department on the 1st of August show a slight decline from the figures of the July report. The average condition for the whole country is 91, a loss of 2 per cent. The State averages are as follows: North Carolina 86, a loss of 18; South Carolina 82, a gain of 1; Georgia 87, a gain of 1; Florida 87, a loss of 4; Alabama 100, a gain of 4; Mississippi 98, a gain of 6; Louisiana 89, a loss of 4; Texas 79, a loss of 11; Arkansas 96, a loss of 7; Tennessee 105, a gain of 4.

The average condition of the crop at the beginning of August for the past three years is as follows:

States.	1877.	1878.	1879.
North Carolina	88	82	86
South Carolina	88	97	82
Georgia	85	92	87
Florida	93	99	87
Alabama	94	98	100
Mississippi	90	92	98
Louisiana	106	90	89
Texas	96	108	79
Arkansas	93	98	96
Tennessee	90	92	105
General average	93	95	91

Of 310 counties reporting the crop, 68 report 100, 65 above, and 177 below, as shown in the following table:

States.	Number of counties reporting 100.	Number of counties reporting above.	Number of counties reporting less.	Total in each State.
North Carolina	8	8	20	36
South Carolina	2	1	18	21
Georgia	15	6	46	67
Florida	3	1	10	14
Alabama	6	10	9	25
Mississippi	9	13	16	38
Louisiana	1	3	15	19
Texas	7	5	29	41
Arkansas	9	11	10	30
Tennessee	8	7	4	19
Total in ten States	68	65	177	310

As was foreshadowed in our report for July, the condition has declined 2 per cent. This was caused by the drought which endured till near the

last of July. North Carolina, Louisiana, and Texas have felt its effects most severely, but at the date of the reports rains were reported generally. Alabama and Mississippi report large gains during the month, and at the date of returns made complaint of too much rain. Many complaints of shedding are received, and the extreme heat has caused much to open prematurely. Insect injuries are reported in some localities in Alabama, Mississippi, and Texas, but to a limited extent.

The following extracts from correspondents are given :

NORTH CAROLINA.—*Alamance*: Improved by rains. *Beaufort*: Rather below usual size, which is an advantage here, as the weed is generally too large. Well fruited, and condition in every respect good. *Bladen*: Small but fruiting well; late rains may cause the forms to shed. *Cabarrus*: Very promising. *Chowan*: Stand and plants better than for years. *Columbus*: Has stood the dry spell well; not large, but fruiting favorably. *Cumberland*: In a healthy condition. *Duplin*: Rains have caused luxuriant growth; squares shedding, and should the rains continue many days longer the crop will be cut off one-third. *Martin*: Not so large in weed, but full of forms; no shedding yet. *Mecklenburg*: Small but fruited well; ten days later than last year. *Nash*: Small, but full and fruited to the top. *Pamlico*: Condition fine. *Pasquotank*: Fully 25 above the average. *Pitt*: Bottom crop well set with fruit, but the weed is dwarfed by the drought; it is beginning to grow rapidly, but sheds forms badly; middle crop also damaged by shedding. *Union*: Late rains will cause much shedding of squares. *Wilson*: Slightly affected by drought. *Alexander*: Looks well. *Bertie*: Injured by rains, causing shedding of young bolls. *Gates*: Weed growing rapidly, but may be too late to fruit well. *Greene*: Badly injured, but favorable season may make two-thirds of a crop.

SOUTH CAROLINA.—*Barnwell*: No reasonable expectation of an average crop. *Beaufort*: Sea Island injured by drought and hot weather. *Chester*: Small, but well fruited and growing rapidly. *Chesterfield*: Small but looks well. *Clarendon*: Rains have caused it to take new growth, but it is shedding badly. *Colleton*: Looking and doing finely; is fruiting well, and with favorable season the crop will be a large one. *Fairfield*: Drought has retarded growth; too late to mature a full crop, although the stand is pretty good. *Georgetown*: Weed not so tall and ten to fifteen days late, but the plant is uniform and healthy, and bolling heavily. *Horry*: Rains have caused shedding of forms. *Lexington*: Has stood the dry weather, but cannot possibly reach an average yield. *Laurens*: Is now taking on a second growth of weed and shedding its shapes. *Marion*: Been raining for six days; extreme wet weather will damage the present cotton prospect. *Newberry*: Rains causing the cotton to grow rather "sappy." *Union*: Short of an average promise. *Williamsburg*: Great improvement in the prospect. *York*: Plant small but well fruited; with favorable season the crop will almost equal that of last year. *Greenville*: Held up remarkably well considering drought.

GEORGIA.—*Baker*: Damaged by drought, particularly where guano was used on old and worn lands. *Banks*: Rains doing much good. *Berrien*: Lice and cut-worm very severe on crop; rust has made its appearance. *Brooks*: Small weed and some rust caused by drought. *Carroll*: Shedding badly on account of rains. *Clayton*: Stood the drought well, and the weed, though small, is full of forms; for the last week have had excessive rains, and but little sunshine. *Cobb*: Should the rains continue, cotton will be materially injured. *Coweta*: Rains have caused considerable shedding. *Dodge*: Reports of rust; much shedding caused by rains. *Dooly*: Drought and rains causing cotton to shed its fruit and rust badly. *Early*: Reviving, but weed much smaller than last year. *Forsyth*: Full average now, but cannot tell what the result will be from the present excessive rains. *Fullton*: Best stand for ten years; weed large and well fruited. *Gwinnett*: Good stands, well worked and fruited; present indications good. *Hart*: No perceptible injury as yet; heavy rains may cause shedding.

Harris: Cut short by drought. *Heard*: Rust in some fields. *Henry*: Small; having good rains now. *Jackson*: Only half a crop, owing to three months' drought. *Jones*: Ten days late, and developing very slowly, and small. *Laurens*: Small, but never better fruited at this season. *Lee*: Unusually small, and threatened with rust and caterpillars. *Lincoln*: Taken on a new and vigorous growth under the late rains; middle crop lost, and prospects of a moderate middle crop. *McDuffie*: Rains have caused the cotton to throw off its fruit and take the rust. *Macon*: Fifteen days later than last year; apprehensions of damage from caterpillars. *Meriwether*: Weed very small. *Milton*: Cotton fine, but there is too much rain and not enough sunshine; up to the last ten days it was full of forms, but rains have filled the stalk with too much sap and growth, and caused shedding of forms. *Muscogee*: Small and late, though growing and improving. *Schley*: Doing as well as possible under fine rains. *Sumter*: With good season, will make a fair crop. *Thomas*: Bolls small and shedding; rusting on old lands. *Talbot*: Backward in fruiting and weed small, but the season for its full development has not arrived and planters are hopeful. *Telfair*: Unless very much improved by late rains, there will not be half a crop. *Terrell*: Excessive rains causing cotton to take second growth and shed considerably; caterpillars in some districts, but no damage done by them. *Troup*: Growing finely. *Warren*: In some sections of county rains too late to make more than half a crop. *Wilkes*: Small, and shedding in some places; in others crop fine. *Gordon*: Should there be no shedding of squares, the yield will be a full one. *Stewart*: Rains have caused cotton to commence growing again; not much mature fruit on uplands.

FLORIDA.—*Alachua*: Rains have improved the crop. *Jefferson*: Late planted a better stand, larger weed, and much better fruited than the early; rust on light land, and some caterpillars; no damage as yet from the latter. *Madison*: Small, but doing well. *Suwannee*: May improve if the present showers do not cause it to shed.

ALABAMA.—*Bullock*: Two weeks later, but unusually full of fruit; weed small but well limbed; damaged by rust; caterpillars appeared, but have not as yet injured the crop. *Chambers*: Doing well so far. *Coffee*: Rust and cotton-moth reported, but no damage complained of. *Conceh*: Weed well grown, with a superabundance of fruit; worms reported from some localities where they have appeared for two or three years past. *DeKalb*: Light showers benefiting the cotton. *Perry*: Fine weather has pushed forward the cotton, and the plant shows a healthy fruiting not equaled since 1869. *Shelby*: Maturing unusually fast; no worms as yet. *Saint Clair*: Stand fine and no worms. *Autauga*: Doing well; crop has been well worked and is now laid by; no worms. *Greene*: Above the condition, but ten days later than last year; no worms reported. *Wilcox*: Three weeks earlier than last year, and has been kept clean; in good condition, and no damage from worms. *Barbour*: Caterpillars in small force, but no damage as yet; rust has appeared in the manured lands. *Crenshaw*: Full size and full of bolls and forms; rust and lice reported in several localities; have heard of worms on one farm. *Dale*: Poor, but plenty of time to mature a full crop; no caterpillars reported in the county. *Macon*: Doing well, but worms feared on account of heavy rains. *Covington*: Continued rains have caused much shedding.

MISSISSIPPI.—*Benton*: In fine condition. *Choctaw*: Condition much better than at this time last year. *Amite*: Should the rains continue crop may be damaged by worms; if not so injured, look for a full average crop. *Adams*: Smaller than last year, but contains more fruit; no worms have appeared up to date. *Hancock*: Never better. *La Fayette*: With no more rains cotton will exceed an average. *Monroe*: Crop clean and looks extremely well; plant full, and no worms. *Neshoba*: If the season continues favorable will reach 125. *Tishomingo*: Never was a better season or cleaner crop. *Carroll*: Prospects now of too much rain for cotton. *Covington*: Plenty of rain, and cotton doing well. *Rankin*: Season favorable. *Smith*: Two weeks late, but in a healthy condition; fears of damage from worm, as they have appeared ten days earlier than usual. *Attala*: Full of forms, and doing well. *Grenada*: Much affected by drought, but is recuperating from favorable showers. *Marshall*: Unusually promising.

Nozabee: Plant small, but fruiting well. *Tippah*: Smaller than usual, but well worked and full of fruit. *Kemper*: Looks promising, but are having too much rain. *Madison*: Too much rain; shedding badly; on uplands much affected by drought; on lowlands very fine. *Franklin*: Bids fair to make an abundant yield. *Lee*: Injured by heavy rains causing shedding of bolls. *Holmes*: Shedding badly, and if the rain continues many days longer will lose much of our crop. *Copiah*: Recent rains have caused rapid growth and much shedding of bolls. *Tute*: Somewhat better than at this time last year; growing too rapidly. *Lowndes*: Small but unusually well fruited; some complaints of boll-worms, though less than for several years.

LOUISIANA.—*West Feliciana*: A few caterpillars, but no damage reported. *Washington*: Looks well; should there be no disaster from now until crop is fully matured, the yield will be in advance of any crop for years past. *Bossier*: A few boll-worms, but no army-worms. *Franklin*: Injured by drought; in many places stopped growing and is shedding forms. *Madison*: Small, but fruiting and growing well. *Richland*: Promising; late rains have recuperated the crop; but few worms. *Pointe Coupee*: Weather fine for the crop. *Avoyelles*: Cotton-worms made their first appearance July 15. *Caddo*: No rain since May 5; cannot make over three-fourths of a crop. *Concordia*: Recent rains have benefited the young cotton, but caused the old to shed badly; worms reported in several sections of the parish.

TEXAS.—*McLennan*: About 0.75 inches of rain since May 5; planters generally rate the average condition of cotton much lower than 25. *Navarro*: Green, but very small in growth, and but few bolls; no rain since May 5. *Bexar*: Almost ruined; late planting will make nothing. *Fannin*: Much benefited by late rains; finest crop ever raised in the county. *Red River*: Rains, and cotton now doing well. *Austin*: No worms; blooms and young bolls falling off; opening fast and prematurely. *Bastrop*: Will not average one-third of a bale to the acre; too far gone to be benefited by rains. *Upshur*: Cotton two weeks earlier than usual; no caterpillars, and but few boll-worms. *Grayson*: Did not suffer from the drought, and rains have put it in splendid condition. *Polk*: Doing well; worms reported, but no damage. *Victoria*: Picking has commenced; worms damaged it a little; stunted growth the principal drawback. *Collin*: Shedding forms badly on account of hot, dry weather. *Houston*: With good rain soon cotton may reach a fair average. *Kendall*: Will be a failure unless we have rain within a week or two. *Anderson*: Crop will be small; shedding forms. *Rusk*: Blooming near the top, which shows that it has stopped growing; suffered most on the highlands. *Trinity*: In many localities a failure. *Washington*: Picking commenced July 20; staple not as good as last year and only about 500 pounds of lint to five acres. *Angelina*: Looks very fine; stalk not so large as usual, but heavily laden with bolls. *Lavaca*: Shedding badly; worms in some localities, but no damage. *Rockwall*: Shedding forms, and the crop will be short unless there is rain soon. *Titus*: Plants fine and healthy, but need rain. *Waller*: Has stopped growing. *Williamson*: Looks well under the circumstances, but unless there is rain soon the crop will be very short.

ARKANSAS.—*Drew*: Unusually good. *Garland*: Seasonable weather will give us a good crop. *Prairie*: Fields in good condition, and with favorable weather a full crop will be made. *Stone*: Never better prospect; just sufficient rains. *Arkansas*: Everything burning up in July; now too much rain will cause shedding of bolls. *Fulton*: Never saw cotton look as well; well cultivated, free from disease, fruiting finely, and in good growing condition. *Little River*: The average will reach 150 in some sections of the county. *Crawford*: Rains have caused much shedding and it is now too late for new squares to form and mature to a great extent. *Izard*: Unusually promising, except in a few neighborhoods. *Pulaski*: Dry weather has caused it to open prematurely. *Woodruff*: Needs rain. *Clark*: Looks fine and shows no signs of rust. *Pope*: Badly damaged and shedding squares. *Sebastian*: It is thought that the crop will be larger than for years. *Craighead*: With favorable weather cotton will commence opening in twenty days, which is unusually early for this county. *Howard*: Unusually promising.

TENNESSEE.—*Decatur*: Prospect very good now, and better than for three years past. *McNairy*: Fine prospect for a large crop. *Gibson*: Promises more than an average. *Henderson*: Never looked better; very full of forms. *Dyer*: Never was a finer promise for a heavy crop than at the present time.

CORN.

The general average of the condition of corn on the 1st of August was 93 against 93 in July; as compared with August, 1878, there is a considerable decline, being 93 this and 96 last year.

Of 1,172 counties reporting the condition of the crop on August 1, 239 report a full average condition, 309 report above, and 624 below, as shown in the following table:

States.	Averaging 100.	Under 100.	Over 100.	Total.	States.	Averaging 100.	Under 100.	Over 100.	Total.
Maine.....	1	10	1	12	Texas.....	2	44	2	48
New Hampshire.....	2	4	6	12	Arkansas.....	4	17	10	31
Vermont.....	4	6	1	11	Tennessee.....	7	31	9	47
Massachusetts.....	2	1	1	3	West Virginia.....	7	28	8	33
Rhode Island.....	2				Kentucky.....	10	41	16	67
Connecticut.....	2		3	5	Ohio.....	7	49	3	59
New York.....	14	12	12	38	Michigan.....	7	18	10	35
New Jersey.....	6	5	2	13	Indiana.....	6	32	3	41
Pennsylvania.....	7	27	7	41	Illinois.....	28	17	32	75
Delaware.....					Wisconsin.....	17	10	9	36
Maryland.....		9	3	12	Minnesota.....	22	4	19	45
Virginia.....	8	51	2	61	Iowa.....	19	7	31	57
North Carolina.....	9	34	6	49	Missouri.....	8	7	68	83
South Carolina.....		21	21	42	Kansas.....	7	2	21	30
Georgia.....	6	67	3	76	Nebraska.....	3		17	20
Florida.....	2	12	1	15	California.....	6	1	1	8
Alabama.....	5	18	2	25	Oregon.....	6	5		11
Mississippi.....	5	23	10	38					
Louisiana.....	2	17	1	20	Total.....	239	624	309	1,172

An analysis of our returns shows that favorable and unfavorable conditions distribute themselves in sections and zones. The New England and Middle Atlantic States all show a high average, and the only complaints were of a late spring. In Pennsylvania and Maryland the drought was not very injurious, and timely rains restored the crops to a fair average. In Virginia and the South Atlantic States the drought cut short the early-planted corn; the late planted was in condition to be benefited by the rains so generally reported at the date of our returns. In the Gulf States, Alabama and Mississippi report a fine condition, but Louisiana is low, and Texas makes the worst record of any State in the Union. Kentucky, Ohio, and Indiana report an average somewhat below that of last year, while Illinois reports a very high condition. The States west of the Mississippi all report extraordinary growth and most favorable prospects. Iowa reports 104, Missouri 115, Kansas 114, Nebraska 113. The Pacific States with their small area planted in this cereal note a fair average.

The following extracts from correspondents are given:

MAINE.—*Oxford*: Growing finely, but two weeks late. *Fork*: Did not start well, but is improving rapidly.

NEW HAMPSHIRE.—*Cheshire*: generally good stand; some fields thinned by crows; some damage by cut-worms. *Rockingham*: Two weeks late; backward spring. *Sullivan*: Looking well; eight days late.

VERMONT.—*Franklin*: Late, but fair.

MASSACHUSETTS.—Late; full stand and healthy; heavy crop if it escapes frost.

NEW YORK.—*Schoharie*: Late; excessive rain. *Washington*: Looks remarkably well. *Genesee*: Unfavorable season; now growing well, but is small and late. *Livingston*: Growing fast; greatly improved by July rains.

NEW JERSEY.—*Atlantic*: Improved by recent rains. *Burlington*: Poor growth during early spring; now growing rapidly; some fields very promising. *Cape May*: Recent rains improved it. *Essex*: Blades curled by drought during July; since recent rains looks promising. *Hunterdon*: Will exceed present estimate should rain be abundant. *Warren*: Retarded by drought; prospects improved by recent rains.

PENNSYLVANIA.—*Armstrong*: Late; cold dry spring; much improved by warm weather and recent rains; many fields badly eaten by cut-worms. *Beaver*: Late, but now growing fast; cannot make average crop. *Blair*: Abundant rains in July made prospects quite good. *Butler*: Full average but, a little late. *Clearfield*: Poor; drought and late planting. *Clinton*: Promises full crop since rain. *Huntingdon*: Improved by late rains. *Indiana*: Promises a large crop. *Lehigh*: Very promising. *Monroe*: Drought during June and July. *Northumberland*: Short; thin stand. *Sullivan*: Wonderful improvement since last report; warm weather and frequent rains.

MARYLAND.—*Harford*: Very much revived by recent rains. *Queen Anne*: Sufficient rain; growth somewhat retarded by cool June nights; earing splendidly and past danger. *Talbot*: Some fields injured by storm July 25. *Howard*: Cut short; severest drought known for years. *Caroline*: Injured by drought. *Carroll*: Exceeds the immense crop of 1875. *Worcester*: Excessive drought; improved by recent rains.

VIRGINIA.—*Fauquier*: Looking well, and if seasonable will make a heavy crop. *Augusta*: Good rains have improved the crop. *Botetourt*: Not injured by drought, having propitious weather which warrants a fine outturn. *Elizabeth City*: Early planted injured by drought. *Franklin*: A considerable portion of the crop so dried that there will be no ears on it. *Floyd*: Fine rains at this time and will greatly improve. *Henry*: Early upland nearly ruined by drought. *James City*: Greatly damaged by drought. *Lunenburg*: The severest drought for ten years. *Middlesex*: Crop severely damaged by the drought, but greatly improved by a week's rain since July 25. *Prince William*: Early planted past redemption; the late crop improving by the rains. *Pulaski*: Badly injured by drought in July; recent rains will benefit. *Warwick*: Assisted by late heavy rains, will probably make an average crop. *Brunswick*: Corn small, but with the present fine rains will make one-half to three-fourths of a crop. *Frederick*: Improved very much since the rains; had the drought continued ten days longer the crop would have been cut off entirely. *Gloucester*: Late planted looking first rate. *Hanover*: Upland or forward corn literally burnt up. *Mecklenburg*: No amount of rain can now give us an average crop on uplands. *Orange*: Corn has resisted the drought remarkably well; a fair crop can now be made. *Princess Anne*: Rain came too late. *Bath*: Corn in a twist from drought, but rain has come at last. *Caroline*: Except it rains soon, but little if any can be made. *Amelia*: Promised well in the spring, but crop will be curtailed by drought. *Amherst*: Seasonable weather now will hardly make more than three-fourths of a crop. *Halifax*: Crop has suffered from protracted drought; recent rains will improve it. *Madison*: Generally worked well, but below an average from drought; uplands cannot make more than half a crop. *New Kent*: Crop cut short at least one-fifth. *Richmond*: Injured very much by drought. *Spottsylvania*: Dwarfed, and with the best season possible will make a small crop. *Sussex*: Fears were entertained of a total failure, but the present abundant rains are making quite a favorable change.

NORTH CAROLINA.—*Alamance*: Early corn cut short fully one-half; the season is now all that could be desired, and late corn will be good. *Beaufort*: In some neighbor-

hoods injured by drought, but abundant rains throughout the county now, and a fair crop almost certain. *Bladen*: Bid fair early in the season but was injured by drought. *Chatham*: Suffered from the long drought. *Chowan*: Injured by the drought. *Columbus*: Injured considerably by drought; the rains not general. *Cumberland*: Early corn affected by the severe drought; late will make a heavy crop. *Forsyth*: Suffered very much from drought; upland cannot make more than three-fourths of a crop. *Gaston*: So little rain that upland corn little more than kept alive, and the yield will be very low. *Granville*: Much of the crop beyond recovery from the drought. *Jackson*: Recent rains will make corn nearly an average. *Madison*: Never more promising than in some parts of this county now. *Martin*: Has suffered from drought, but the rains are bringing it out now. *Mecklenburg*: Suffered very much for rain. *Nash*: Early planted will be short; on stiff lands almost a failure. *Pasquotank*: The crop looks better than for ten years. *Person*: Badly injured by the extended drought, but will be somewhat improved by the recent rains. *Pitt*: Early corn damaged beyond recovery, but late corn bids fair to make a good crop. *Rowan*: Damaged at least 20 per cent. by drought. *Transylvania*: Has suffered on uplands from drought, but the bottom and swamp lands more than make up the loss. *Union*: Late greatly benefited by recent rains. *Wake*: Seriously injured by drought, except where the crop has received deep and thorough tillage. *Wilson*: Affected by drought. *Yadkin*: Suffered severely from dry weather. *Greene*: Early planted ruined by drought.

SOUTH CAROLINA.—*Barnwell*: Reduced on account of drought, though the prospect is good in some localities. *Beaufort*: Greatly injured by drought of June and July. *Chester*: Three-fourths of the entire crop on uplands a total failure from drought. *Chesterfield*: The worst year in a long time; injured by drought; too dry to plant late corn till July 5. *Clarendon*: Barely a half crop; caused by excessive heat more than the want of rain. *Colleton*: Not more than half crop will be made. Corn planted in March has fallen off 50 per cent.; that planted in April doing well. *Fairfield*: At least three-fourths of the county has suffered from drought, cutting off almost entirely the upland corn. *Georgetown*: Continued drought and extraordinary heat fatal to crop. *Horry*: Cool nights in June, drought, and heat very injurious; the worst prospect for twenty years. *Lexington*: Greatly injured by drought of several weeks' duration. *Laurens*: Forward uplands cannot make more than two-thirds of an average; bottom lands will be an average crop if no disaster. *Marion*: The worst crop since 1869. *Newberry*: Very good on low or bottom lands, but on uplands injured by drought. *Union*: Late corn on creek and river bottoms and some uplands very fine; on most uplands no amount of rain will produce more than a half crop. *Williamsburg*: Yield reduced three-fourths by dry weather. *York*: The drought has seriously injured upland corn; bottom lands, however, will make an average crop.

GEORGIA.—*Baker*: Seriously damaged by a five weeks' drought. *Banks*: Fine rains doing much good. *Berrien*: Injured by drought and by various kinds of worms preying on it. *Brooks*: Late corn almost a failure. *Carroll*: Suffered from drought in June and July. *Catoosa*: Late corn rapidly improving since the rains. *Clayton*: Early corn on upland completely parched; will not make one-fourth of a crop. *Cobb*: Prospect now of an average crop. *Coweta*: Upland corn barely a half crop; bottom lands never better. *Dodge*: Corn burnt up in some places and will not make anything. *Dooly*: Badly injured by drought. *Early*: Seriously injured by twelve weeks' drought. *Fannin*: Short at least one-fourth on account of drought; not rain enough to thoroughly wet the ground since planting. *Forsyth*: Some sections of the country have full average, others have suffered from drought. *Fulton*: A full average; recent rains have greatly improved the crop. *Hart*: Materially injured by drought. *Harris*: Cut short by a two months' drought. *Henry*: Upland corn a failure; on bottom lands looking well. *Jackson*: Bottom corn good; damaged by drought on upland. *Jones*: Upland corn almost a total failure. *Lincoln*: Has suffered more than the cotton from the drought; the early planted on upland a total failure. *Marion*: Materially injured by hot suffocating winds. *Milton*: The best crop for ten years, and season suited to its

growth. *Montgomery*: Injured by long drought during June and July. *Muscogee*: Crop so seriously injured by drought that it will not be revived by recent rains. *Pike*: The rains too late, except for the late planted. *Franklin*: An unusual dry spring and summer has cut upland corn short, and injury is now feared to the general crop from excess of rain. *Sumter*: Too far gone to be saved by rain. *Thomas*: A good prospect up to the 1st of July; since then injured by drought. *Talbot*: Not more than one-fourth of this county visited by rain; the entire crop will be a very short one. *Towers*: Upland ruined and bottom lands badly injured. *Troup*: Late corn, and that growing on low lands, greatly improved by recent rains. *Warren*: In some sections will make a good crop, in others showers too late to make a half crop. *Wilkes*: Upland corn too far gone to be benefited by recent rains.

FLORIDA.—*Gadsden*: Cannot possibly come up to a half crop. *Madison*: Cut off by dry weather. *Suwanee*: Corn has suffered worse from dry weather than any other crop. *Wakulla*: Injured at least 40 per cent. by drought, and the fodder now injured by rain.

ALABAMA.—*Bullock*: Rains came in time to help late corn, but the crop will be considerably below the average. *Calhoun*: Upland corn badly damaged by drought. *Chambers*: Considerably injured by four weeks of drought. *Coffee*: Injured by excessive heat and drought. Late corn doing well, and plenty of rain now. *Connoch*: Present prospect of a full crop. *DeKalb*: Forward corn damaged by drought. *Shelby*: Recent fine showers will materially aid the development of the crop. *Autauga*: Materially injured by drought; no rain since planting. *Greene*: Not in average condition owing to drought. *Madison*: Early corn will not make more than a half crop. *Wilcox*: On uplands, considerably injured by drought, but the general average good. *Barbour*: Almost ruined by six weeks' drought. *Crenshaw*: Improved since last report. *Dale*: Crop very poor. *Macon*: Cut short by hot, dry weather; rains came too late to save the early corn. *Thurston*: With good season, may reach a condition of 95. *Covington*: Crop cut short at least one-third by drought.

MISSISSIPPI.—*Benton*: Injured by drought, except late corn, which promises to do well since the rain. *Amite*: The rains have improved late corn. *Adams*: Crop fallen off on account of dry season. *Hancock*: Corn crop fine. *Monroe*: The early corn cannot make more than a half crop; the late corn greatly improved since the rains, and will now make a fine crop. *Neshoba*: Early corn injured by drought, the late corn doing well. *Carroll*: Crop short on account of drought. *Covington*: Injured considerably by drought of five weeks. *Rankin*: Early corn injured by a month's drought. *Smith*: A drought of four to seven weeks, and March corn considerably injured. *Attala*: Early corn injured by drought. *Greene*: No rain in parts of the county for seven weeks; corn falling down in the fields. *Grenada*: Early corn short one-fourth to one-third. *Marshall*: Crop unusually promising. *Noxubee*: The best crop raised in this county for years. *Tippah*: Crop well worked, and only a few farms suffered seriously for want of rain. *Kemper*: Crop poor on account of dry weather. *Madison*: May corn promising, the earlier corn not a half crop. *Franklin*: Prospect not good, owing to drought. *Lee*: Early corn cut off by drought, the late by excess of rain. The late crop cannot be plowed for mud and water, and is running to weeds and grass. *Holmes*: Rains came too late for corn. *Tate*: Improved by late rains. Late corn will be fair.

LOUISIANA.—*Washington*: Continued drought will materially lessen the yield. *Franklin*: Short from drought, which still continues. *Madison*: Injured by drought, but will give a greater yield than that of last year. *Richland*: The long drought injured corn, yet the crop will compare favorably with that of last year. *Bienville*: In some instances a failure on account of drought and insufficient work. *Caddo*: A small percentage of corn crop all that can be made.

TEXAS.—*Navarro*: The drought still continues, and corn dry on the stalk and nothing but nubbins. *Bexar*: Some corn reported to yield ten bushels per acre, but hundreds of acres will not make the seed planted. *Fannin*: Late corn benefited by re-

cent rains. *Red River*: Condition reduced by drought. *Austin*: About half an average, except on black heavy lands and bottom lands, where it is a good crop. *Bastrop*: Crop made and very light; average 10 to 15 bushels. *Upshur*: Short from dry weather except on fresh or manured lands. *Grayson*: Not beyond a half crop. *Polk*: Not over a half crop will be gathered. *Collin*: Affected by continued drought. *Bowie*: Will average but one-half to two-thirds, owing to long drought. *Kendall*: Absolute failure from drought. *Grimes*: On account of drought there will not be enough corn made for home consumption. *Rusk*: The severest drought since 1860, and corn cut off one-half. *Trinity*: Has suffered for rain; in many instances almost a failure. *Washington*: Being gathered; 5 bushels per acre will prove the average. *Angelina*: Cut off fully one-half by drought; will not be enough corn made in this county for home use. *Titus*: Set back by wet spring and bad stand, followed by severe drought. *Fayette*: Crop cut short fully one-half by drought.

ARKANSAS.—*Drew*: Corn has suffered terribly from drought throughout the country. *Garland*: The abundant rainfall insures a good crop. *Stone*: Crop never better. *Fulton*: The prospect for a full and large crop never better. *Izard*: Corn unusually promising. *Pulaski*: Badly injured by drought. *Woodruff*: Seriously injured by drought. *Clark*: Corn splendid on account of timely rains. *Pope*: Injured by continued drought. *Sebastian*: Injured to some extent by drought in July. *Newton*: A fine prospect for corn. *Ashley*: Injured by drought, but if rains continue late corn will make an average crop.

TENNESSEE.—*White*: Greatly damaged by drought since the 1st of July. *Anderson*: Severe drought just when rain was most needed, and crop will be short one-fourth to one-third. *Bedford*: Seriously damaged by drought where not well worked. *DeKalb*: May equal last year's crop, but the early planting only a half crop. *Loudon*: Good rains, and corn will improve. *Serier*: It is surprising how corn lives when all moisture is gone and the mercury at 106° in the shade; the late planted looking well, but the early crop nearly ruined. *Unicoi*: Greatly improved since the recent rains. *Monroe*: Forward corn cut short by drought. *Bradley*: Prospect not favorable. *Coffee*: Thirty-nine days' drought; early corn suffered considerably. *Decatur*: Good prospect for corn. *Marion*: An unprecedented drought; will make a half crop of corn. *Rhea*: Showers now, and late corn will improve. *Smith*: Damaged by dry weather. *McNairy*: Will make a full average. *Gibson*: The crop has not been better for years. *Polk*: Crop will be short on account of drought in the spring and early summer. *Blount*: But little rain since planted. *Haywood*: Crop good, early corn made; this county, it is thought, will have corn enough for two years. *Montgomery*: The rains came in time for both the early and late corn. *Dyer*: Prospect good for a heavy crop. *Bledsoe*: A good prospect since the rains. *Greene*: Not over half a crop in portions of the county.

WEST VIRGINIA.—*Braxton*: Over average. *Brooke*: Recent rains improved it. *Ca-bell*: Half crop; ground has not been thoroughly wet since April 1; gloomy outlook for all growing crops. *Doddridge*: Growth retarded by drought. *Greenbrier*: Entire failure in some localities; may make three-fourths crop. *Grant*: Improved by recent rains. *Hampshire*: Fine promise for full crop since rain. *Mercer*: Average. *Morgan*: Injured by drought. *Marshall*: Promising. *Preston*: Full crop. *Raleigh*: Poor stand; replanted. *Roane*: Came up badly, but now looks better. *Tyler*: Some improvement since rain. *Wayne*: Drought. *Wirt*: Backward; replanted. *Wetzel*: Extremely light crop. *Jefferson*: Injured by drought. *Harrison*: Good prospects for average crop. *Logan*: Cut short by drought; recent rains may improve it. *Marion*: Promises a fair yield since rain. *Randolph*: Growing finely; early and well stalked.

KENTUCKY.—*Boone*: Light crop; drought. *Bath*: Three-fourths crop. *Bracken*: Good prospects. *Breckinridge*: Very dry; needs rain. *Calloway*: Flattering; over average. *Crittenden*: May reach 120. *Cumberland*: Half crop; drought. *Carroll*: Failure unless it rains soon. *Carter*: Short; drought. *Daviess*: Over average; fine prospects for a heavy yield. *Edmonson*: Half crop; drought. *Fayette*: Injured by

drought. *Fulton*: Looking well. *Graves*: Prospects very good; above average yield. *Hancock*: Some complaints of lice on the roots; late rains may remedy the difficulty. *Hardin*: Much below average; drought. *Jessamine*: Improved since rain. *Johnson*: Short crop; drought. *Kenton*: Poor prospect. *Lyon*: Very large crop. *Lincoln*: Bad stand; prospects gloomy. *Laurel*: Greatly injured by drought. *Lee*: Looks well. *Logan*: Crop cut short by drought. *Mason*: Backward; replanted; cut-worms and drought. *Montgomery*: Improved since recent rains. *Muhlenburg*: Fine. *Metcalfe*: Half crop; no rain for two months. *Nelson*: Doing well. *Ohio*: Damaged by cold wet weather in April. *Pendleton*: Cut short by drought. *Rowan*: Late rains improved it. *Russell*: Half crop; drought. *Shelby*: Yield above average. *Washington*: Late and irregular. *Allen*: Half crop; drought. *Clay*: Recent rains have brought it up to our full expectations. *Owen*: About half crop; injured by drought. *Taylor*: Will be ruined if it does not receive rain soon. *Trigg*: Good crop; seasonable showers; farmers hopeful. *Oldham*: Recent rains will improve it. *Grant*: Two-thirds crop. *Union*: Promises best crop for several years.

OHIO.—*Athens*: Poor; ground has not been well soaked since planting. *Allen*: Below average; defective seed. *Auglaize*: Injured by drought. *Ashtabula*: Improved since rain. *Clermont*: Retarded by drought. *Coshocton*: Injured by drought. *Darke*: Improved since rain. *Fulton*: Abundant harvest of everything. *Geauga*: Unusually promising. *Guernsey*: Injured by drought. *Highland*: Half crop; late spring, bad stand, and drought. *Hancock*: Late; replanted; defective seed. *Hardin*: Improved since rain. *Henry*: Promises average. *Holmes*: Recent rains improved it. *Hocking*: Backward; late rains may improve it. *Lawrence*: Drought is withering it up; little rain since April. *Lorain*: Growing finely; thin stand in many fields. *Logan*: Poor stand; uneven; replanted; defective seed. *Mercer*: Good where a full stand was secured. *Noble*: Improved since rain. *Perry*: Promises well. *Scioto*: Fields not replanted much above average. *Sandusky*: Prospects good. *Summit*: Promises full average. *Tuscarawas*: Late but looks well. *Union*: Improved since rain. *Vinton*: Poor stand; drought. *Wyandot*: Growing fast; thin in many fields. *Lake*: Crop very short; severest drought known for years. *Portage*: Improved since rain, and making rapidly. *Clark*: Looks as if it would be a failure on clay lands; will be improved on bottom lands by recent rains. *Warren*: Poor stand; condition good; may make average crop with favorable fall. *Knox*: Below average.

MICHIGAN.—*Bay*: Injured by drought. *Branch*: Hardly average. *Benzie*: Retarded by drought. *Clinton*: Light crop; drought. *Genesee*: Poor; drought. *Lenawee*: Many fields poor and late. *Livingston*: Injured by drought. *Mason*: Looks fair. *Van Buren*: Small crop. *Charlevoix*: Seriously injured by drought. *Neraygo*: Improved rapidly during July; acreage greater than any former year. *Tuscola*: Immediate rains might save it. *Wexford*: Nearly dead in the hill; cannot ear until rain falls. *Bemen*: Never looked better. *Muskegon*: Below average.

INDIANA.—*Adams*: Good condition but uneven. *Bartholomew*: Gloomy prospects; drought. *Carroll*: Below average; suffering for rain. *Clark*: Half crop. *Dubois*: Drought. *De Kalb*: Late; replanted; defective seed. *Dearborn*: Backward and irregular on bottom lands. *Decatur*: Will perish unless it rains soon. *Franklin*: Uneven; recent rains improved it. *Gibson*: Late. *Huntington*: One month behind time, but promises well. *Hamilton*: Drought causes prospects to grow poorer daily. *Howard*: Backward; drought and defective seed. *Kosciusko*: Never promised better. *Madiwon*: Inferior crop; drought and defective seed. *Marion*: Suffering for rain; will be severely injured unless it rains soon. *Putnam*: Poor prospects; no rain for four weeks. *Ripley*: Much below average; drought. *Spencer*: Drought is damaging it. *Steuben*: Indications of a large yield. *Switzerland*: Drought. *Tippecanoe*: Splendid prospects. *Whitley*: Never looked better. *Wabash*: Many poor fields; seed defective. *Noble*: Not well cultivated. *Brown*: Well worked, but has commenced to wilt; failure unless it rains soon; streams drying up and farmers despondent. *Harrison*: Materially injured by drought; but 7.58 inches rainfall since April 1. *Ohio*: Crops almost a failure from protracted drought.

ILLINOIS.—*Boone*: Weather favorable; crop above average. *Brown*: Will fall much below average if it does not rain soon; very dry since April 1. *Carroll*: Somewhat injured by chinch bugs where it stands contiguous to wheat fields. *Crawford*: Drying up. *De Kalb*: Will not attain average. *Edgar*: Suffering for rain. *Ford*: Needs rain. *Fulton*: Looking well. *Fayette*: Farmers jubilant over the corn crops. *Greene*: Promises average. *Hamilton*: Small acreage, but best condition for fifteen years. *Iroquois*: Very promising, but about two weeks late. *Jefferson*: May be injured by intense hot weather. *Kendall*: With seasonable showers may make average. *Kankakee*: Growing rapidly. *La Salle*: One or two more rains will make it an excellent crop. *Livingston*: Looks favorable. *Lawrence*: Burning up. *Marshall*: Best crop for several years. *Madison*: Prospering finely. *Montgomery*: Large yield. *Ogle*: Never better. *Peoria*: Recent rains brought it up to average, but it is late. *Putnam*: Growing finely, but needs rain. *Piatt*: Suffering for rain. *Saint Clair*: Such luxuriant fields never seen before; everybody is happy. *Sangamon*: Promises more than average. *Tazewell*: Uneven; replanted. *Vermillion*: Largely above average. *Woodford*: Surpasses any crop in forty years. *Wayne*: Never as well cultivated. *Clark*: Good. *Morgan*: Backward; drought makes it very poor on rolling lands. *Mason*: Late rains improved it some. *Mercer*: Above average.

WISCONSIN.—*Dane*: Needs rain. *Fond du Lac*: Injured by drought; cannot ear fully. *Greene*: Looking well, but needs rain. *Grant*: Excellent. *Green Lake*: Suffering for rain. *Richland*: Some bottom fields injured by wet. *Walworth*: Looks well; thin stand in some localities. *Racine*: Looks well, but a thin stand. *Trempealeau*: Never better. *Dunn*: Rain brought it up to average; acreage decreased. *Waushara*: Injured by drought.

MINNESOTA.—*Becker*: Good prospects. *Blue Earth*: Damaged by hail. *Cottonwood*: Excellent. *Fillmore*: Favorable weather will make it over average crop. *Jackson*: Never better. *Kandiyohi*: Hot, wet weather set it ahead. *Pope*: Small acreage; doing well. *Ramsey*: Strong and forward. *Renville*: Heavy crop anticipated. *Watonwan*: Many fields destroyed by hail-storm July 2. *Redwood*: Promising; decreased acreage.

IOWA.—*Adams*: Drought. *Benton*: Never better. *Cherokee*: Two weeks earlier than usual; crop safe. *Calhoun*: Fine crop. *Des Moines*: Suffering badly; no rain since July 3. *Decatur*: Best for twenty-five years. *Fremont*: Three weeks early and promising; some fields injured by grub-worms. *Guthrie*: Suffering for rain. *Grundy*: Late planted needs rain; bulk of crop looks well. *Hardin*: Drought may injure it. *Hancock*: Booming; never better; prospect of yield 50 bushels per acre. *Howard*: Fine condition. *Hamilton*: Exceeds any former year; unusually large growth. *Jasper*: Will not make half crop unless it rains soon. *Jefferson*: Damaged by wet in June and by drought in July. *Linn*: Fair prospects; some injury by chinch-bugs. *Lee*: Short crop; drought. *Lucas*: Injured by chinch-bugs where it is contiguous to wheat-fields. *Montgomery*: Slightly injured by drought. *Marion*: Drought may injure it. *Mahaska*: Critical condition; four weeks' drought. *Shelby*: Suffering for rain in north half of county. *Story*: Injured by drought. *Tama*: Drought will shorten the crop. *Taylor*: Excellent. *Wayne*: Best ever raised. *Madison*: Drought will cut it short.

MISSOURI.—*Adair*: Excellent; everything prosperous. *Bollinger*: Best since 1855. *Benton*: Never better. *Barton*: The only crop we can boast of; one or two more rains will make it beyond precedent. *Bates*: Will average 80 bushels per acre. *Caldwell*: Magnificent; good on all kinds of land. *Cass*: Best ever raised; will average 50 bushels; one-third increase in acreage. *Chariton*: Best for several years. *Christian*: Never so good; yield will be beyond precedent. *Daviess*: Enormous. *Gentry*: Growing finely; best prospect we ever had. *Greene*: Never had such a good crop. *Grundy*: Best ever known. *Jasper*: Injured by drought. *Johnson*: Heavy crop. *Lincoln*: Drought has ruined our fine prospects. *Lawrence*: Never better. *Macon*: Best crop within the recollection of the oldest inhabitant. *Montgomery*: Will be much injured if it does

not rain soon. *Madison*: Never saw better prospects; early planted is already made. *New Madrid*: Big crop. *Newton*: Revived by recent rains. *Polk*: Somewhat spotted. *Putnam*: All crops in good condition. *Platte*: Average. *Phelps*: Indications of the biggest crop for years. *Pettis*: Surpasses anything known in eighteen years; will average 55 bushels. *Perry*: Looks well since rain; a little short in stalk. *Scott*: Prospects never better. *Shelby*: Best for twenty years, large acreage. *Taney*: Best ever seen in the county. *Washington*: Improving since rain; very dry spring. *Worth*: Excellent weather in July for growing crops. *Sullivan*: Recent rains have made the best prospect for years. *Clay*: About made, and very fine. *Laclede*: Heaviest crop for years. *Shannon*: Best in ten years. *Vernon*: Above average. *Mercer*: Extra good.

KANSAS.—*Butler*: Prospects never better. *Barton*: Acreage more than double; yield will be three times that of any other year. *Douglas*: Out of danger, and promises a very heavy crop. *Ellis*: Heavy crop. *Edwards*: Half crop; unprecedented drought. no rain from December to May 18. *Leavenworth*: Best ever raised in the county; *Marion*: Never saw it do better. *Paucene*: Retarded by drought, but now doing well. *Rush*: Good. *Reno*: Never looked better. *Woodson*: Best prospect ever known. *Bourbon*: Needs rain. *Franklin*: Prospects good for an extra large crop. *Montgomery*: Stood the drought well; late rains make the prospects the best we ever had.

NEBRASKA.—*Douglas*: Immense crop. *Saunders*: Good stand; promises extra good crop. *Boone*: Recent rains have worked wonders; prospects now excellent. *Clay*: Splendid; best we have ever had. *Merrick*: Best crop ever raised in county. *Antelope*: Magnificent; full stand; earing and silking finely. *Cedar*: Improved 15 per cent. during July. *Harlan*: Some injury by chinch-bugs and drought.

CALIFORNIA.—*Placer*: Full average crop; season very favorable.

OREGON.—*Clackamas*: Favorable weather during July improved it. *Josephine*: Not so good as usual; too much rain. *Douglas*: Backward; cold wet spring; warm weather of July improved it very fast.

DAKOTA.—*Hanson*: Never looked better.

SPRING WHEAT.

On the 1st day of August the general condition of spring wheat was 81, against 75 last year. The following table shows the comparative condition of this crop during the first three months of the growing seasons of 1878 and 1879 in the leading States growing it:

States.	1878.			1879.		
	June.	July.	August.	June.	July.	August.
Maine.....	102	105	99	108	97	97
New Hampshire.....	105	98	102	101	100	100
Vermont.....	106	97	97	105	98	96
New York.....	100	94	103	95	89	93
Ohio.....	101	101			91	90
Michigan.....	102	101	95	102	93	95
Illinois.....	104	98	94	105	83	76
Wisconsin.....	110	103	95	95	90	85
Minnesota.....	106	100	52	108	93	80
Iowa.....	110	90	69	90	88	79
Missouri.....	98	94	90	107	93	90
Kansas.....	100	90	72	109	68	44
Nebraska.....	113	105	91	109	92	86
California.....	90	98	97	110	92	90
Oregon.....	101	90	89	99	104	104
Average.....	100	100	75	90	91	81

The month of July brought severe trials to spring wheat. In northern New England and New York rust and worms are noted among the

injuries of the crop, yet in this region the July averages were fully maintained. In the West and Northwest leading complaints were drought and chinch-bugs. Occasionally our correspondents note the same extreme temperature which shriveled the grain last year. Rust and blight were also observed in some localities. These destructive influences were felt in their greatest measure in Kansas, where the August condition of the crop was only 47, against 68 in July and 109 in June. In Nebraska much damage was occasioned by excessive and unseasonable rain in some counties. In California rust is complained of, and in Humboldt County a worm resembling the cabbage-louse is reported as injuring the crop. The grain, in many cases, fails to present the standard weight of 60 pounds per bushel. In Oregon the crop presents a very fine condition, though in Wasco County it was affected by fire blight.

Compared with the previous year, the condition of the crop is 6 per cent. better, and the loss of condition during July was only 10 per cent., against 31 per cent. in 1878. With its increased acreage, especially in the unascertained area of the Territories, we may expect from the spring wheat crop a considerable increase of yield over the previous year.

The following extracts from correspondents are given :

MAINE.—*Oxford*: Looking poor; considerable rust.

VERMONT.—*Franklin*: Some good fields; others thin and eaten by worms.

MICHIGAN.—*Charlevoix*: Severely injured by drought. *Mason*: Poor; drought. *Benzie*: Injured by drought, *Tuscola*: Generally good. *Wexford*: Drought has about ruined it. *Berrien*: Excellent crop; "Fultz" ahead of all others.

INDIANA.—*Orange*: Always proved a failure.

ILLINOIS.—*De Kalb*: Promised well until chinch-bugs destroyed it. *Livingston*: Destroyed by chinch-bugs. *Ogle*: Cut short by early drought and chinch-bugs; quality good. *Woodford*: Failure; chinch-bugs. *Fullon*: Almost a failure. *Lee*: Badly injured by chinch-bugs; yield 10 to 15 bushels per acre; poor quality. *Winnebago*: Badly injured by wet and chinch-bugs. *Carroll*: Cut short 20 per cent. by chinch-bugs. *Marshall*: Fair crop; quality excellent. *Mason*: Failure. *Mercer*: Badly damaged by chinch-bugs. *Boone*: Cut short by drought and chinch-bugs.

WISCONSIN.—*Walworth*: Not promising. *Brown*: Some fields destroyed by chinch-bugs. *Chippewa*: Injured badly by rust and chinch-bugs. *Dodge*: Injured by hot weather and chinch-bugs, but not so bad as last year. *Grant*: Very short; drought and chinch-bugs. *Juneau*: Half crop; chinch-bugs. *La Fayette*: Injured by rust and chinch-bugs. *Marathon*: Some injury by rust. *Marquette*: Some fields on new land entirely destroyed by chinch-bugs. *Outagamie*: Injured by blight. *Racine*: Severe injury by hot weather and chinch-bugs. *Buffalo*: Chinch-bugs and hot weather have considerably injured late-sown. *Barron*: Badly smutted; poor seed. *Trempealeau*: Short crop but good grain. *Door*: Weevil reported in one locality. *Fond du Lac*: Better grade than last year. *Green Lake*: Harvested in good condition; a few fields injured by chinch-bugs. *Dunn*: Injured by rust, blight, and chinch-bugs.

MINNESOTA.—*Cottonwood*: Considerable injury by rust and blight. *Blue Earth*: Blighted badly. *Rice*: Considerable injury by blight. *Faribault*: Blighted by moist, hot weather. *Goodhue*: Suffered largely from storms, and "scab" or blight. *Houston*: Injured by chinch-bugs. *Isanti*: A No. 1. *Jackson*: Badly blighted by hot weather; half crop. *McLeod*: Good quality; average yield 15 bushels. *Martin*: Half crop; blight. *Nicollet*: Average yield 15 bushels; good quality. *Renville*: Much better quality than last year. *Ramsey*: Some injury by blight and lodging. *Steele*: Injured by blight and hail. *Stearns*: Rank growth of straw and weeds, especially of

wild buckwheat. *Wright*: Stand not as thick on ground as last year; some lodging; good quality but reduced yield. *Freeborn*: Early-sown blighted; late-sown rusted. *Todd*: Prolonged drought; average 15 bushels, *Kandiyohi*: Some injury by hot, wet weather. *Pope*: Our main crop; "Lost Nation" and "Fife" generally sown; the latter considered best, does not lodge readily, plumper and fairer berry, makes better flour, and of superior yield; crop unprecedently large and fine. *Rock*: Failure; blight and grasshoppers. *Watonwan*: Hail storm of July 2 destroyed many fields. *Carver*: Injured by severe rain storms in July. *Clay*: Many fields destroyed by hail storm July 21; quality No. 1. *Redwood*: Good; averages 12 bushels. *Wadena*: Damaged by rust and smut.

IOWA.—*Buena Vista*: Some blight; harvested in excellent condition. *Benton*: Fifteen per cent. destroyed by chinch-bugs. *Cherokee*: Thin on ground; remarkably plump grain; "Fife" wheat badly blighted. *Calhoun*: Best crop since 1869; will average 18 bushels. *Grundy*: Light straw; good plump berry; better yield than last year. *Greene*: Cut and stacked; chinch-bugs destroyed one-fourth of crop. *Hardin*: Some fields badly blighted, others injured by black rust. *Iowa*: Very much injured by chinch-bugs. *Lyon*: Destroyed by grasshoppers. *Lucas*: Chinch-bugs doing great damage. *Marion*: Average yield; quality excellent. *Sioux*: Destroyed by grasshoppers. *Adams*: Cut short by chinch-bugs and rust. *Howard*: Half crop; chinch-bugs; yield 8 bushels. *Mahaska*: Harvested in good condition. *Guthrie*: Injured by drought and chinch-bugs; yield from 4 to 11 bushels. *Jones*: Chinch-bugs and blight have nearly ruined it; but few fields worth harvesting. *Madison*: Damaged by chinch-bugs; average yield 9 bushels. *Decatur*: Mostly taken by chinch-bugs. *Fremont*: Averages 13 bushels; good quality grain. *Taylor*: Short crop; chinch-bugs. *Emmett*: Extreme heat of July caused some blight. *Mitchell*: Some blight, rust, and chinch-bugs.

MISSOURI.—*Adair*: Harvested in good condition. *Benton*: Some damage during harvest by wet weather. *Chariton*: Injured during harvest. *De Kalb*: Good crop. *Sullivan*: Some damage in shock by rain. *Vernon*: Better yield than expected; "Fultz" the leading variety. *Mercer*: Badly damaged by wet weather.

KANSAS.—*Clay*: Damaged by chinch-bugs. *Ellis*: Drought reduced average yield to 8 bushels. *Barton*: Nearly a total failure; drought. *Nemaha*: Damaged in shock by rain. *Republic*: Chinch-bugs ruined it; but few fields cut. *Reno*: Very poor. *Johnson*: Turning out better than expected. *Atchison*: Less damage by wet than anticipated.

NEBRASKA.—*Adams*: One-fourth destroyed by late rains. *Hamilton*: Large quantities spoiled by continued rain. *Hall*: Damaged by rain; overripe and shelling out in field. *Knox*: Good but thin on ground; seed did not germinate well; dry spring prevented stooling. *Lancaster*: Damaged by chinch-bugs; too much rain during harvest. *Saunders*: Thin on ground; injured by rain, rust, blight, and chinch-bugs. *Cass*: Injured during harvest by rain. *Boone*: Harvesting in good condition. *Clay*: Much injured in shock by rain; one-third yet uncut; average reduced from 20 to 12 bushels. *Merrick*: Considerable injury by rain in harvest; some chinch-bugs, the first in twenty years. *Antelope*: Injured by drought, honey-dew, and grasshoppers. *Harlan*: Some late-sown fields not worth cutting; drought.

CALIFORNIA.—*Contra Costa*: Some injury from rust. *Humboldt*: All crops promise well; a few acres of late-sown have been destroyed by an insect much like the cabbage-louse. *Napa*: May not yield as well as expected. *Stanislaus*: About two-thirds of last year's crop; grain less than 60 pounds per bushel. *Placer*: Rather thin on ground; berry large and plump; crop about 5 per cent. below average.

OREGON.—*Josephine*: 25 per cent. better than last year. *Lane*: Good. It is difficult to separate winter from spring crops, as farmers sow all the fall. *Marion*: Never looked better; above average; wet spring. *Multnomah*: Heavy crop. *Umatilla*: Best ever raised; double the yield of last year. *Wasco*: Damaged by what is called "fire blight." *Clackamas*: Favorable July weather improved it. *Douglas*: Rusted considerably.

DAKOTA.—*Hanson*: Half crop; drought and poor seed.

TOBACCO.

The severe drought that prevailed in many of the large-producing tobacco States from about the time of planting to within a short period of the transmission of our correspondents' returns for August 1 resulted, as was anticipated, in a marked decline in the condition of this crop at that date. The plant, in many cases no doubt, was so dwarfed in the beginning by the extreme dryness of the earth and the intense heat of the sun as that under no subsequent condition of weather, however favorable, could it entirely recover. And yet we may reasonably believe (so great and often astonishing is the outcome of tobacco) that, under the favoring influence of recent copious rains, the general condition has already greatly improved, and that this improvement will be even more decided on September 1, the date for our next returns.

The general condition for the whole country, August 1, is estimated to be 77 against 84 the same day last year, and against 88 the first of last month; a loss as between the two years of 7, and as between the two months of 11.

The twelve largest tobacco-growing States report the condition of the crop on August 1 as compared with its condition July 1 as follows :

States.	July.	August.	Gain.	Loss.
Massachusetts.....	150	93	.....	57
Connecticut.....	102	103	3	.....
Pennsylvania.....	80	88	8	.....
Maryland.....	96	85	.....	11
Virginia.....	90	66	.....	24
North Carolina.....	92	81	.....	11
Tennessee.....	94	73	.....	21
Kentucky.....	85	79	.....	6
Ohio.....	83	79	.....	4
Indiana.....	86	79	.....	7
Illinois.....	89	99	10	.....
Missouri.....	93	93	No change.	No change.

From this table it will be seen that but three States report an improved condition on August 1 over that on July 1, while eight show a decline, varying from 4 per cent. in Ohio to 57 per cent. in Massachusetts.

As no peculiarity of seasons or of preparation and cultivation in Massachusetts has been observed that would warrant so large a loss as that indicated, the inference is that an error, resulting from too high an estimate last month by our correspondents from that State, has crept in. At this late hour we are unable to determine the extent of the error, but we will doubtless be able to eliminate it from our September report.

The large and material decline in Virginia and Tennessee seems to be due to the greater severity of the drought in those States, our correspondents there representing it to be almost unprecedented.

As compared with August 1, 1878, the record is:

States.	1878.	1879.
Massachusetts	105	93
Connecticut	105	105
Pennsylvania	85	88
Maryland	87	85
Virginia	80	66
North Carolina	84	81
Tennessee	85	73
Kentucky	80	79
Ohio	96	79
Indiana	75	79
Illinois	88	99
Missouri	95	93
General average, estimated from our tables	84	77

OATS.

The average condition of oats August 1 is represented by 91 against 100 in August, 1878. There is, however, an improvement over the July figures, which represent the condition of the crop as but 89. The entire Atlantic slope shows a better condition than in July, as also do the Southern Inland States, the States north of the Ohio, and the Pacific slope. The Gulf States and the trans-Mississippi States show a decline. The States showing average condition or above are the New England and Middle States, except Pennsylvania, South Carolina, Alabama, Michigan, Wisconsin, Minnesota, California, and Oregon. The lowest condition, 64, is found in Kentucky, Kansas being 65. With a decreased acreage and depressed condition it is easy to predict a crop considerably short of the exceptionally large crop of 1878.

BUCKWHEAT.

The area planted in buckwheat shows a slight decrease since last year. The States of New York and Pennsylvania, in which one-half of the buckwheat of the country is grown, show a loss of 3 per cent. In Ohio, Michigan, and Wisconsin, which produce the larger portion of the remainder, the acreage is nearly the same as last year. The condition is good; rather better than last year at this time.

POTATOES.

The condition of the potato crop is 97 against 88 in July. The New England States show a stationary condition at 98; the Middle States rise from 95 to 102; the South Atlantic States fall from 90 to 88; the Gulf States are stationary at 90; the Southern Inland States fall from 84 to 81; the States north of the Ohio show a very marked improvement, rising from 74 to 93; west of the Mississippi there is a decline from 101 to 98, while on the Pacific slope there is a slight appreciation from 100 to 101. In the northern portion of the Atlantic slope, above Maryland, the conditions of growth appear to have been very favorable;

the Colorado beetle is mentioned by but two correspondents in this region. Farther south the drought considerably affected the crop. In the Gulf States this crop is grown to a limited extent, being displaced by sweet-potatoes. The leading complaint here is lack of moisture. The rains were not in time to maintain the July average in the Southern Inland States, but the crop was saved from serious disaster. The earlier plantings were generally most successful.

The improving influence of July rains was felt especially in the region north of the Ohio. On the eastern slope of the Mississippi the "old-fashioned potato-bug" is noted, but its ravages were mostly local. Mc-Donough, Illinois, reports the fields nearly stripped of leaves by it. West of the Mississippi the crop was needing rain, but in Hamilton, Nebraska, rains were excessive. The crop, on the whole, is well reported on the Pacific coast.

The following extracts are given :

MAINE.—*Knox* : Crop a total failure in some localities ; bugs. *Oxford* : Confident of a good crop ; some destruction by the Colorado beetle. *Penobscot* : Bugs numerous in some localities. *York* : Bugs not so numerous in southern part of county as last year ; no abatement in back townships.

NEW HAMPSHIRE.—*Cheshire* : Fair prospects for full crop ; beetle successfully treated with Paris green.

VERMONT.—*Franklin* : Good crop ; but few beetles.

MASSACHUSETTS.—*Berkshire* : Prospects for full crop.

NEW YORK.—*Schoharie* : Above average prospects. *Rockland* : Small ; drought. *Genesee* : Doing well. *Tioga* : But few beetles.

NEW JERSEY.—*Atlantic* : Early crop injured by drought ; recent rains improve them. *Camden* : Crop shortened by drought ; sweet-potatoes injured by cold spring. *Essex* : Large acreage ; drought and bugs will make the crop light. *Salem* : Sweet-potatoes injured by hail-storm and insects. *Warren* : Early crop fair average ; recent rains improved prospects of late planted.

PENNSYLVANIA.—*Armstrong* : Early planted injured by drought ; late crop promising. *Beaver* : Promising since rain. *Butler* : Never better. *Clinton* : Full crop ; but few beetles. *Indiana* : Large yield ; nearly matured. *Lehigh* : Very promising. *Northumberland* : Fine since late rains. *Sullivan* : Recent showers greatly improved them. *Westmoreland* : Injured by the Colorado beetles.

MARYLAND.—*Harford* : Short crop ; drought and beetles.

VIRGINIA.—*Augusta* : Good rains lately, and crop improved. *Botetourt* : Irish potatoes cut short by drought. *Elizabeth City* : Irish potatoes greatly benefited by recent rains. *Middlesex* : Irish potatoes severely damaged by Colorado beetle. *Prince William* : Late potatoes looking well. *Pulaski* : Both early and late potatoes affected by drought. *Hanover* : Late potatoes cut very short. *Princess Anne* : Irish potatoes planted in June and July actually roasted in the ground. *Madison* : Irish potatoes very fine ; best crop raised for several years. *Spotsylvania* : Early Irish potatoes fair ; the late crop did not come up well.

NORTH CAROLINA.—*Beaufort* : Drought prevented a full crop being planted. *Chowan* : Sweet-potatoes very poor. *Columbus* : An important crop, but could not be planted early for want of rain. *Pasquotank* : Irish potatoes, especially "Beauty of Hebron," turned out well.

GEORGIA.—*Carroll* : Have suffered from drought. *Dooly* : Have a long time to grow in, and have a flattering appearance at present. *Jackson* : Irish potatoes a small crop. *Muscogee* : Reviving somewhat, and may yet make a good yield.

ALABAMA.—*Calhoun* : Irish potatoes matured before the drought. *Chambers* : Irish

potatoes little grown; those planted cut off by April frost. *Saint Clair*: Late Irish potatoes injured by dry weather.

ARKANSAS.—*Garland*: Not promising until the recent abundant rainfall. *Stone*: Crop materially damaged by drought. *Pope*: Irish potatoes almost entirely ruined by dry weather.

TENNESSEE.—*Anderson*: Potatoes short. *De Kalb*: Almost ruined by drought. *Gibson*: Irish potatoes very fine, large, and well flavored. *Polk*: Cut short by drought in the spring and early summer.

WEST VIRGINIA.—*Brazton*: Very good. *Brooke*: Improved by recent rains. *Hampshire*: Promises full crop. *Mercer*: Retarded by drought. *Morgan*: Abundant crop. *Preston*: Never better.

KENTUCKY.—*Lincoln*: Almost a failure; drought. *Montgomery*: Failure. *McCracken*: Damaged by the old-fashioned potato bugs. *Russell*: Late planted almost a failure. *Union*: Good promises for a full crop.

OHIO.—*Ashtabula*: Improved since rain; early planted small size and medium crop. *Perry*: Slow growth; bugs plentiful. *Scioto*: About average. *Finton*: Early planted half crop. *Wyandot*: Doing well. *Summit*: Improved wonderfully since rain. *Lorain*: Never better. *Athens*: Half crop; drought; late planted looking well. *Highland*: Drought. *Mercer*: Good; bugs have not displayed their usual ability in destroying them. *Portage*: Never better. *Knox*: Damaged by bugs. *Mahoning*: Good promise since rain.

MICHIGAN.—*Lenawee*: Look well. *Livingston*: Injured by drought. *Genesee*: Poor. *Branch*: Very fine and abundant. *Bay*: Will be total failure unless it rains soon. *Newaygo*: Drought caused light crop. *Tuscola*: Light crop; drought. *Wexford*: Rain would improve late planted. *Muskegon*: Light crop, but better than expected.

INDIANA.—*Clay*: Short crop; drought and three varieties of bugs. *Dubois*: Short; drought. *Franklin*: Poor; drought, beetle and striped bugs. *Hamilton*: None, except early planted. *Kosciusko*: Never better. *Switzerland*: Injured by drought. *Whitley*: Promises of a big crop. *Owen*: Early crop fair; late will be very short; drought and bugs. *Marion*: Late planted will be a failure unless it rains soon. *Brown*: Need rain.

ILLINOIS.—*Ford*: Very short. *Greene*: Striped bugs about ruined late planted. *Hamilton*: Good early crop; late planted killed by bugs. *Johnson*: Bugs numerous. *Kankakee*: Full average. *McDonough*: Nearly every field is stripped of leaves by the long striped bug. *Boone*: Best prospects for years. *Montgomery*: Late crop injured by drought and bugs; early crop fine. *Shelby*: Late crop will be a failure. *Sangamon*: Early varieties matured well; the old fashioned striped bugs have gone through the late crop. *Morgan*: Injured by drought and bugs; crop almost a failure. *Carroll*: Varieties sent out by Department last year are giving general satisfaction. *La Salle*: Will be entire failure if drought continues. *Wayne*: Old fashioned bugs have about ruined the vines.

WISCONSIN.—*Walworth*: Fine quality; excellent yield. *Columbia*: Need rain. *Chippewa*: Bugs numerous. *Grant*: Excellent. *La Fayette*: Very fine. *Waukegan*: Some injury by bugs, but still promise well. *Barron*: Injured by bugs. *Trempealeau*: Good crop; no damage by bugs. *Door*: Colorado beetle not so destructive as in former years. *Fond du Lac*: Injured by drought. *Green Lake*: Need rain.

MINNESOTA.—*Becker*: Improved by recent rains, *Cottonwood*: Heavy crop. *Ramsey*: Full crop. *Pope*: Few in hill and rather small. *Redwood*: Number one crop, both in quantity and quality.

IOWA.—*Adams*: Some injury by drought; but few bugs. *Marion*: Fears of injury by drought. *Sioux*: Need rain. *Story*: Injured by drought. *Hancock*: Never better. *Howard*: Fine condition. *Mahaska*: May be injured by drought. *Madison*: Need rain. *Hamilton*: Drought. *Lee*: Short crop; drought.

MISSOURI.—*Chariton*: Large yield. *Gasconade*: Early crop short; late crop good; some trouble with beetles. *Jefferson*: Troubled by a dark blue fly. *Johnson*: Heavy

crop and quality fine on dry lands; inclined to be watery on heavy rich lands. *Maccon*: Good. *Perry*: Early crop total failure; late planted look well. *Shelby*: Fine early crop. *Caldwell*: Early planted small crop, but quality good; late crop promises well. *Jasper*: Early planted average crop; late crop will be a failure if drought continues. *Newton*: Reduced by drought. *Lewis*: Early crop good; late planted nearly destroyed by the striped bugs.

KANSAS.—*Patnee*: Large crop of bugs are making a small crop of potatoes. *Reno*: Damaged by drought, worms, and grasshoppers; may make one-third crop. *Woodson*: Early crop small and taking second growth. *Franklin*: Early crop rotted some during rainy spell.

NEBRASKA.—*Hamilton*: About eaten up by bugs; continued rains causing them to rot. It has rained every 48 hours for three weeks. *Boone*: Improved since rain; promises full crop. *Clay*: Much injured by bugs and now rotting badly. *Harlan*: Mostly taken by bugs.

CALIFORNIA.—*Humboldt*: Above average. *Placer*: Surpasses any crop ever raised in county.

OREGON.—*Lane*: Look well, but said to be small. *Multnomah*: Blight hurt most of the early planted.

DAKOTA.—*Hanson*: Fair early crop; late planted taken by "quaker bugs."

WASHINGTON TERRITORY.—*San Juan*: Below average; weather too wet.

HAY AND PASTURES.

The summer of 1879 has not been favorable for the hay crop. The drought of June and July which was so detrimental to the other crops also seriously shortened this. Timothy hay is above average in only eight States. In the New England and Middle States the crop is good; but in all the Southern States it is short. In the States bordering on the Ohio River the same cause, drought, has reduced the product very materially since 1878. In the Northwestern States the returns are favorable, while in Kansas and Missouri they are very low. The Pacific States report very high averages. At the date of our returns rains were generally reported, and the prospect for the fall pastures was good.

The following extracts from correspondents are given:

MAINE.—*Franklin*: Excellent as far as secured; pasture good. *York*: Harvested in good condition.

NEW HAMPSHIRE.—*Cheshire*: Average crop. *Rockingham*: A little above average crop; harvested in good condition; pastures good.

VERMONT.—*Franklin*: Good crop. *Orleans*: Harvested in good condition. *Rutland*: Nearly all secured; condition good.

MASSACHUSETTS.—*Berkshire*: Best crop for years; harvest delayed by rain.

CONNECTICUT.—*Hartford*: Harvested early and in good condition.

NEW YORK.—*Washington*: One-fifth below average. *Genesee*: Light crop, but secured in good condition.

NEW JERSEY.—*Cape May*: Drought. *Essex*: Short crop; pasture retarded by drought. *Middlesex*: Gathered in fine condition. *Warren*: Average crop; condition good; pastures improving finely since rain.

PENNSYLVANIA.—*Armstrong*: Light crop; secured in good condition. *Beaver*: Short; drought. *Butler*: Failure; half ton per acre; pasture good. *Clearfield*: Injured by early spring drought. *Clinton*: Short crop; drought. *Huntingdon*: Pastures improved by recent rains. *Indiana*: Housed in good condition. *Montour*: Thin and short; drought. *Northumberland*: Short crop, but quality good.

MARYLAND.—*Howard*: Hay and fodder small and dried up; pastures almost burnt

up, and farmers feeding. *Carroll*: Yield light on account of drought in May and June, and more or less damaged by wet weather at harvest; pasture splendid. *Worcester*: Very short for want of rain at proper season.

VIRGINIA.—*Fauquier*: Pastures almost burnt up. *Augusta*: Good rains, and pasture improved. *Botetourt*: Timothy and pasture cut short by drought. *James City*: Pasturage nothing but dried grass. *Middlesex*: Timothy ruined by dry weather. *Pulaski*: About one-half the crop of last year. *Tazewell*: Timothy and clover very short, owing to the severe drought; pastures very dry and short. *Hanover*: Hay saved in fine condition; pasture simply dried up. *Bath*: Hay not equal to one-third of last year's crop. *Caroline*: Pastures drying up. *Amherst*: Hay crop very short, but saved in excellent condition. *Madison*: Crop less than last year, but saved in good condition; pasture not good on account of drought. *Richmond*: Clover and pasture very much injured by drought. *Spottsylvania*: Pasture very short.

NORTH CAROLINA.—*Cabarrus*: Clover and pastures injured by drought. *Jackson*: Clover hay gathered without a shower, and in the best of condition. *Madison*: Pasture good early in the season, but short from drought now. *Nash*: Hay short on account of dry weather, but that saved is in fine condition. *Transylvania*: Herd-grass excellent, and weather fine for saving it. *Wayne*: No rain for nine weeks, and wood pastures completely burned up. *Yadkin*: Pastures suffered greatly from dry weather.

SOUTH CAROLINA.—*Lexington*: Pasture very poor; literally burnt up in some sections.

GEORGIA.—*Carroll*: Pastures have revived greatly from recent rains.

TEXAS.—*Austin*: But little hay cut, the grass being too short; the crop will be an exceedingly light one. Pasture worse than for eighteen or nineteen years. *Bastrop*: Grass burning up. *Collin*: Pasture burning up from dry, hot weather. *Washington*: Nearly ruined by drought. *Titus*: Hay of all classes badly damaged by drought; pasture parched. *Fayette*: Pasture burnt up entirely. *Menard*: Natural pasturage 50 per cent. below the average of the last fifteen years.

ARKANSAS.—*De Witt*: Prairie grass about dead, and dry enough to burn. *Crawford*: Land that produced 1½ tons per acre last year was not worth cutting this year. *Pope*: Pasture burnt up.

TENNESSEE.—*Bedford*: Clover, timothy, and red-top saved without rain. *De Kalb*: Hay and pasture injured by drought. *Serier*: Hay put up in the very best condition. *Unicoi*: Pastures parched and nearly bare. *Monroe*: Hay crop almost a failure. *Coffee*: Hay crop and pastures have been very poor. *Polk*: Clover cut short by drought. *Grundy*: Hay and pasture damaged by two months' drought. *Grainger*: Meadows and pastures ruined, but are improving a little since the rain.

WEST VIRGINIA.—*Hampshire*: Pastures improved by recent rains. *Hardy*: Failure; drought. *Raleigh*: Not so good as last year. *Wirt*: Poor; drought. *Braxton*: Poor. *Brooke*: Short crop, but harvested in good condition; pastures very short. *Marshall*: Promising. *Doddridge*: Short; drought. *Harrison*: Half crop; pasture burnt up. *Gilmer*: Pasture very short. *Roane*: Very short; drought. *Logan*: Very much hurt by drought. *Randolph*: Recent rains improved pasture.

KENTUCKY.—*Boone*: Small crop; drought. *Cumberland*: Meadows light, except clover; pastures dry and stock suffering. *Edmonson*: Clover good; pastures dried up; stock beginning to suffer. *Fayette*: Few meadows worth cutting. *Kenton*: Timothy half crop. *Lincoln*: Shortest crop ever known; pastures dead. *Lee*: Light; drought. *McLean*: Average. *Meade*: Almost a failure; pasture dried up. *Montgomery*: Failure; drought. *Russell*: Short crop, but harvested in good condition; pastures poor. *Simpson*: Drought almost ruined pastures and meadows; clover sown last spring died. *Warren*: Harvested under average. *Woodford*: Pasture parched; stock in poor condition. *Bath*: Very short. *Bracken*: Poor. *Carroll*: Pasture burnt up. *Metcalf*: Pastures burnt up; no rain for two months. *Nelson*: Pasture improving; too wet for clover. *Rowan*: Meadows and pastures burnt up. *Harden*: Pasture

burnt up; stock growing poor; water scarce; hay half crop. *Carler*: Short crop. *Fulton*: Improved by recent rains. *Graves*: Below average, except on lowlands; quality very best. *McCracken*: Harvested in good condition; pastures improving. *Breckinridge*: Very light crop. *Owen*: Half crop. *Taylor*: Half crop. *Oldham*: Pastures badly burnt. *Grant*: Pastures improving. *Union*: Timothy and pastures good.

OHIO.—*Auglaize*: Injured by drought. *Coshocton*: Materially injured by drought. *Darke*: Improved since rain. *Noble*: Light crop, but harvested in good condition; pastures improved since rain. *Perry*: Light crop. *Scioto*: Hay saved in excellent condition. *Geauga*: Good; clover splendid. *Holmes*: Many pastures killed by drought. *Sandusky*: Short crop; condition excellent; pastures very much improved. *Summit*: Clover never was better. *Lorain*: Pastures fine. *Guernsey*: Light crop; pastures improved since rain. *Knox*: Timothy, short crop but good quality; pasture very short. *Mahoning*: Improving since rain.

MICHIGAN.—*Clinton*: Light crop; quality good; pastures poor. *Livingston*: Clover injured by drought. *Genesee*: Poor. *Mason*: Very poor; pastures dried up. *Branch*: Light crop. *Newaygo*: Lightest crop ever known, but excellent quality. *Wexford*: Poor. *Cheybogan*: Pasture suffering for rain. *Eaton*: Shortened by drought. *Muskegon*: Harvested in good condition.

INDIANA.—*Clay*: Meadows injured by drought; pastures burnt up. *Clarke*: Almost a failure; pastures parched. *De Kalb*: Drought. *Crawford*: Shortened by drought. *Floyd*: Almost a failure. *Franklin*: Light crop; well saved. *Madison*: Secured in good condition; timothy three-fourths crop; pastures dry and short. *Putnam*: Good. *Ripley*: Half crop; pastures dried up. *Spencer*: Pastures short. *Brown*: Pastures bare; drought. *Harrison*: Pastures burnt up.

ILLINOIS.—*Cumberland*: Hay and pasture short. *Christian*: Pastures and meadows very short. *DeKalb*: Excellent crop. *Edgar*: Pastures suffering for rain. *Ford*: Very short. *Kankakee*: Did not recover from spring drought. *Lawrence*: Burnt up. *Macoupin*: Short. *Moultrie*: Pasture short. *Montgomery*: Good, but light crop; pastures improving. *Peoria*: Very short; yield not over one ton per acre. *Shelby*: Pastures burnt up; mown meadows look like stubble-fields. *Sangamon*: Almost a failure. *Tazewell*: Good quality, but light crop; pastures dead. *Whitesides*: Clover damaged while cutting; timothy secured in good condition. *Clark*: Very dry; light yield. *Fulton*: Half crop; good quality. *Lee*: Pasture short and dry. *Morgan*: Pasture burnt up; stock sent out of county to graze; water scarce; very short crop; quality good. *Pope*: Three-fourths crop. *Union*: Hay and pastures injured by drought. *Marshall*: Short crop; quality good; pastures very short and dry. *Mason*: Pastures very short. *Boone*: Materially shortened by drought; clover injured by rain in June.

WISCONSIN.—*Green*: Harvested in very best condition. *Brown*: Three-fourths crop. *Columbia*: Quite short; no rain for four weeks. *Chippewa*: Clover heavy and well secured; timothy very light. *Dane*: Pastures need rain. *La Fayette*: Pastures above average. *Racine*: Light crop; pastures look well. *Waukesha*: Fine crop secured in good condition. *Barron*: Three-fourths crop; drought. *Trempealeau*: Harvested in good condition; pasture short. *Douglas*: Heavy crop. *Dor*: Half crop.

MINNESOTA.—*Cottonwood*: Timothy light crop; pastures improving. *Ramsey*: Condition good; clover heavy; timothy light. *Steele*: Prime crop. *Pope*: Meadows and pastures are mostly prairie grasses. *Redwood*: Pastures very good.

IOWA.—*Adams*: Short; drought. *Greene*: Secured in good condition. *Jefferson*: Put up in splendid condition. *Montgomery*: Drought shortened the crop; quality excellent. *Marion*: Harvested in best condition. *Story*: Pastures injured by drought. *Mahaska*: Drought may shorten the crop. *Jones*: Wet weather causes it to grow as in spring. *Linn*: Drought. *Tama*: Pastures poor; late cut meadows look brown and bare as in winter. *Fremont*: Acreage of clover and timothy increases each year. *Hamilton*: Red clover full average; harvested in excellent condition. *Pottawattamie*: Short.

MISSOURI.—*Adair*: Pastures growing finely. *Bollinger*: Timothy half crop; pastures excellent. *Benton*: Timothy very short. *Barton*: Half crop. *Chariton*: Injured by drought in early spring and rain during July; pastures excellent. *Greene*: About half of meadows not worth cutting. *Gasconade*: Short. *Grundy*: Some injury by wet in harvest. *Jefferson*: Failure; drought. *Johnson*: Injured by wet during harvest. *Lawrence*: Hay and pastures injured by early drought. *Macon*: Half crop. *McDonald*: Ruined by drought. *Pulaski*: Crop a little light; quality excellent. *Platte*: Never better. *Pettis*: Half crop; pastures good. *Perry*: Small yield; quality good; pastures splendid. *Shelby*: Half crop; pastures good. *Saint Louis*: Short. *Saint Clair*: Pastures improved since rain. *Scotland*: Drought. *Caldwell*: Improved by recent rains; early mown nearly ruined before stacking; pastures nice. *Newton*: Clover light; timothy very light, some fields not worth cutting; pasture good. *Sullivan*: Some damage by rain during harvest. *Madison*: Drought. *Laclede*: Short crop; drought; pastures improved by recent rains. *Lewis*: Half crop; good quality.

KANSAS.—*Barton*: Pastures excellent; hay half crop. *Kingman*: Very short; drought. *Leavenworth*: Clover fair; many fields of timothy not worth cutting. *Reno*: Very poor. *Montgomery*: Clover and timothy killed by drought; pasture and prairie hay short.

NEBRASKA.—*Boone*: Pastures improved since rain. *Platte*: Recent rains improved pastures.

CALIFORNIA.—*Contra Costa*: Abundant crop; some fields weedy.

OREGON.—*Multnomah*: Very heavy crop; spring wet; pastures excellent; stock looks well. *Wasco*: But little clover grown; alfalfa bids fair to become a staple product. *Douglas*: No clover hay, except that growing wild.

WASHINGTON TERRITORY.—*San Juan*: Wet spring and summer; big crop.

DEPARTMENT OF AGRICULTURE.

SPECIAL REPORT—No. 17.

REPORT

UPON THE

CONDITION OF CROPS

SEPTEMBER 1, 1879.



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1879.

SEPTEMBER REPORT OF GROWING CROPS.

COTTON.

The returns to this department on the 1st of September show a heavy decline in the condition of the cotton crop during the month of August. The general average condition is 85, against 91 for the month ending August 1.

The following are the State averages: North Carolina, 83, a loss of 3; South Carolina, 81, a loss of 1; Georgia, 82, a loss of 5; Florida, 85, a loss of 2; Alabama, 84, a loss of 16; Mississippi, 89, a loss of 9; Louisiana, 87, a loss of 2; Texas, 66, a loss of 13; Arkansas, 99, a gain of 3; Tennessee, 107, a gain of 2.

The average condition on the 1st September for the last five years is as follows:

States.	1875.	1876.	1877.	1878.	1879.
North Carolina.....	90	93	83	86	83
South Carolina.....	80	91	84	80	81
Georgia.....	76	90	77	81	82
Florida.....	75	83	94	91	85
Alabama.....	87	83	91	92	84
Mississippi.....	98	87	88	89	89
Louisiana.....	88	90	92	83	87
Texas.....	94	87	70	101	66
Arkansas.....	96	97	99	95	99
Tennessee.....	96	119	100	91	107
General average.....	88.3	92.3	86	90	85

The number of counties reporting cotton is 321, of which 47 report a condition above 100, 54 report 100, and 220 below. They are classified as follows:

States.	100.	Above.	Below.	Total.
North Carolina.....	8	8	31	45
South Carolina.....	2	1	18	21
Georgia.....	9	2	51	63
Florida.....	5	2	8	15
Alabama.....	4	3	20	27
Mississippi.....	6	7	31	44
Louisiana.....	2	2	14	18
Texas.....	5	2	34	41
Arkansas.....	7	12	10	29
Tennessee.....	8	8	3	19
Total.....	54	47	220	321

As compared with the condition on August 1, the returns to September 1 show a great decline in Mississippi, Alabama, and Texas. In the two first-named States the condition for August was very high, and the

decline is caused by too much rain; in fact, those States had not suffered to any material extent from the drought, so prevalent in June and July, and when the rains came, so much needed in the other sections, they were over-supplied; rust, shedding of squares, and rot were the consequence. In Texas the complaint is of too little rain, suffering from a drought of months; the rain which came so late was of short duration, and many counties report the condition as quite as bad as previous to the rain. Violent storms are reported in parts of Mississippi and in Texas, which have been very destructive in these localities. Rust is reported quite generally over the whole cotton belt. Alabama makes the worst showing, and also reports more damage from insects than any other State.

Insects are reported in most of the States, but the damage is not material. As compared with previous seasons, as seen in the table above, the condition this year is five per cent. lower than last year, and one lower than 1877. In the year 1874 the condition was, however, much lower than this year, as it was then on September 1 only 70.4. At the date of our reports the weather was generally reported favorable, the only complaint being too cool nights. Below are given extracts from our correspondents:

NORTH CAROLINA.—*Cumberland*: Favorable for a good yield; shedding some, and some complaint of rust, owing to late heavy rains; no picking yet. *Gaston*: Stood the drought well; and the damage, if any, caused by late rains, not appreciable as yet. *Hertford*: Considerably injured by storms and heavy rains; still above an average promise. *Mecklenburg*: Depends on the weather for the next fifteen days; if the rain and cloudy weather continue, will not make over half a crop. *Wayne*: Should the future be favorable, crop may yet be a good one. *Wilson*: No improvement, owing to rust; in forward cotton, top crop will be small and inferior. *Greene*: Injured by drought and season too far gone to make both weed and fruit. *Iredell*: Uncertain what the result will be; rainy weather has damaged the crop; weed too large, and fears are entertained that it will open badly. *Lincoln*: Almost a month of rain has caused the plant to grow too rank, and causes apprehension that bolls will fall off before matured; much depends on the month of September. *Pasquotank*: Better than an average, and with favorable season next month yield will be large. *Pitt*: Rust general, and rains have rendered maturing of fruit impossible. *Stanley*: Very promising. *Union*: Rains have caused it to weed and retarded opening. *Wake*: Fine. *Beaufort*: Excessive rains and the great storm of the 18th of August have damaged the crop at least 20 per cent.; few bolls have formed since. *Bladen*: Cotton that was not laid by before the rains set in took the rust and is much injured. *Cleveland*: The result of the rains has been a very fine weed, but not much fruit; a late fall will make the yield better than expected by causing the present blooms to form bolls and open. *Gates*: Nearly ruined by the recent severe storms. *Warren*: The drought, which lasted from May until the 10th of August, will make the cotton very short. *Lenoir*: Cut short by storm of 18th of August, and rust. *Alexander*: Too much rain. *Bertie*: Injured by wind and rain. *Perquimans*: The storm of the 18th caused much damage; had a fine prospect previous to the storm. *Carteret*: Almost destroyed by storm of August 18. *Richmond*: Damaged by rust.

SOUTH CAROLINA.—*Anderson*: Growth excessive, and, should weather continue wet, the under crop will be damaged by rot. *Aiken*: Seriously injured by very excessive rains; injured at least 10 per cent. within the last ten days. *Beaufort*: Sea-island injured by rains and caterpillars. *Nieberry*: Too much rain for cotton. *Chester*:

With favorable weather to October will make a full crop. *Clarendon*: Much damage from rust and blight. *Colleton*: Looks better and beginning to open rapidly. *Laurens*: Rains have caused second growth of weed, which is unfavorable to maturing; fifteen days later than last year, and picking will not commence before the 7th of September. *Union*: The long wet spell has injured the prospects of cotton. *Abbeville*: Rusting in some localities; late crop not promising. *Barnwell*: Rains have damaged the crop instead of improving it. *Chesterfield*: Never saw the rust so general. *Fairfield*: Doing pretty well in some sections; drought, rains, and cool nights have all operated against the crop. *Horry*: General complaint of rust and premature opening of cotton. *Lexington*: Suffered from too much rain; no chance for an average yield. *Georgetown*: Too much rain within the past month; bolls already formed of large size and promising heavy fruiting; rust in some places; weather fair. *Spartanburg*: Mature fruit very scarce in some localities, in others plentiful. *Williamsburg*: Considerable loss of fruit from wet weather; rust to a limited extent; at least ten days later, but, on the whole, promises better than last year. *York*: Seriously damaged by heavy rains; a late dry fall may help matters, but late blooms never make full bolls.

GEORGIA.—*Baker*: Has improved, but the caterpillars are here in great numbers, and much injury is feared owing to lateness of the crop. *Cobb*: Too much rain for cotton; has run to weed, and fruit dropping off; the plant is the largest I have ever seen in this part of the country. *Dooley*: Badly injured by rust and caterpillars. *Habersham*: Too much rain; crop running to weed, and very little fruit. *Harri*: Growth rapid, but fears are entertained of much loss of fruit owing to rains. *Henry*: Damaged by rains; all weed and not more than half a crop of fruit or bolls. *McDuffie*: Improved 20 per cent. on red stiff lands; gray lands ruined by rust. *Marion*: Late by two weeks and has rust. *Montgomery*: Much injured by rust, especially on lands where commercial fertilizers have been used; cut off fully one-third. *Muscogee*: Damaged by wet weather and rust; caterpillars in some portions of the county; poorly balled and late opening. *Thomas*: Too much rain; not doing so well; plenty of weed and no fruit; with a late fall may do better than the present outlook indicates. *Warren*: Unless we have a late fall, crop will be very short; fifteen to twenty days late in picking; rains have caused it to grow rapidly and drop fruit. *Barton*: Late rains have advanced cotton rapidly, and it now promises well, though some of it is injured by what is called "yellow leaf." *Carroll*: Injured by rust, the result of too much wet weather. *Cherokee*: Too much weed and very little fruit. *Coffee*: Not an average quantity of bolls; too much cool weather. *Coweta*: Weather unpropitious, and the crop has fallen off very much; coolest August within my recollection; weed yellow, and consequently there will be but little top cotton. *Floyd*: Too much rain, too much weed, and too much shade; bottom bolls rotting; general complaint of rust, which is doing much damage to the plant. *Gwinnett*: Not so good as in July; excessive rains have caused shedding of fruit and put on vigorous growth of weed; will improve materially with favorable weather in September. *Hall*: Injured by rain. *Hart*: With increased acreage crop will be greater than last year. *Jackson*: Will make but little above half a crop. *Meriwether*: Rains have caused second growth and shedding of bolls; weed fine, with small crop of fruit compared to stock. *Putnam*: Too much rain; large weed and no fruit. *Schley*: Heavy rains caused shedding of forms; weed good, but not much fruit; rusted and opening rapidly. *Troup*: Rains caused it to throw off squares and put on a rapid growth of weed and heavy foliage; backward in opening except upon highly fertilized lands. *Brooks*: Injured by rain; caterpillars now destroying top crop. *De Kalb*: Too much rain; some rust. *Early*: Aside from what is called the "flare-fly," the cotton prospect is fair. *Jefferson*: Considerable complaint of rust. *Jones*: Crop an oddity; on sandy and gray lands the rust is unprecedented; red lands have immense stalks, chock full of squares, but perhaps too late to make; nights cool and unfavorable. *Johnson*: Rain has caused the crop to rust badly; boll rot is doing damage. *Lee*: Abundance of rain; rusting on gray lands, and caterpillars threaten to cut the crop short. *Lincoln*: New growth almost without precedent since the July

rains; late rains will add little or nothing to the crop; fully up to the standard of August 1st. *Milton*: Too much weed and shedding of fruit; it is late opening, and will be of inferior grade. *Talbot*: Early opening fast; stalk short and bolls small, while bottom is shedding badly. *Wilkes*: Too much rain. *Forsyth*: Too much rain; finest weed I ever saw. *Fulton*: Materially injured by heavy rains; much shedding of bolls. *Gordon*: Has run too much to weed owing to rains; late growth has but few bolls. *Heard*: Almost failure on some lands; much damaged, generally by rains and rust. *Stewart*: Since last report has made a great growth of weed and but little fruit; the rust, boll-worm, and caterpillar will injure the late crop somewhat; picking has commenced, but at least three weeks later than last season.

FLORIDA.—*Madison*: Very good; caterpillars, but no damage apprehended. *Wakulla*: Damaged on low lands by heavy rains and an unprecedented freshet. *Columbia*: Rusting badly on old lands; caterpillars present, but not doing much damage as yet. *Leon*: Wet during August caused it to shed and latterly to rot; caterpillars in sufficient force to cut off top crop. *Suwannee*: Caterpillars at work on some farms; too much rain may cause shedding, and increase the number of caterpillars. *Gadsden*: Weed small and rusting; shedding badly, and caterpillars at work. *Putnam*: Worms will reduce the crop to a very low average. *Bradford*: Some rust; caterpillars in a few localities have stripped some fields of all the leaves. *Sumter*: Half the crop destroyed by caterpillars. *Taylor*: Injured some by the late rains. *Marion*: Yielding very well, notwithstanding the rainy spell caused an alarming spread of caterpillars, which would strip fields of almost every leaf in a very few hours.

ALABAMA.—*Autauga*: Materially injured by rains, rust, and boll-worms; rust has done more damage than for years; no blooms on the sandy lands for twenty days past; these lands will not make more than two-thirds of a crop. *Baldwin*: Splendid, and farmers delighted. *Bibb*: Injured badly by rust; prospects poor. *Chambers*: Wet spell in August damaged crop 10 per cent. *Clarke*: Picking ten days late; rains have caused it to run to weed; fresh blooms during the last few days. *Crenshaw*: Nearly ruined by rust. *Dale*: Three weeks later than usual and considerable rust; some complaint of worms; much depends upon the next fifteen days. *Lowndes*: Excessive rains have caused it to shed and rust, and now the worms are working on it. *Monroe*: Injured by rains; worms doing considerable damage on some plantations. *Wilcox*: Injured by rains and caterpillars; the latter are supposed to have destroyed all the crop that does not mature by the first of September. *Barbour*: Excessive rains and very cool weather have developed the boll-worm and caterpillar, and damage has been done by both; weed large, and very little fruit; rust has done material injury in some neighborhoods. *Bullock*: Has had to contend against boll-worms, caterpillars, and rust; have seldom seen a crop so seriously injured; rust pervades the whole county, and on many plantations it will take the product of seven to ten acres to make a bale; staple very inferior. *Calhoun*: Weed very large, but not well fruited in proportion to its size. *Coffee*: Cut off 30 per cent. by rust, and worms on the bottom lands will probably destroy all the green leaves left by the rust. *Corington*: Rust is injuring crop considerably; very good in every other respect. *De Kalb*: No hope of a remunerative yield; damaged by drought, and latterly by excessive rains; a late fall may possibly change the present aspect of the crop. *Shelby*: Cotton-fields now present an October appearance, the foliage fading and falling off, all owing to rust; opening rapidly, and many think it will all be picked and housed by November 1. *Conecuh*: Fine rains; some rust, and a few complaints of worms; bolls opening well, and picking lively; some hopes of a top crop. *Perry*: Never saw so great a decline in the cotton crop in one month; weather unfavorable, causing bolls to shed and rot; army and boll worms and rust have done much damage. *Saint Clair*: Has stood the season well. *Franklin*: Owing to the long drought, followed by too much rain, the cotton is rapidly shedding its squares; it is also attacked by black and red rust, which, it is thought, will diminish the crop fully one-fourth; picking not yet commenced.

MISSISSIPPI.—*Attala*: Going too much to weed, although holding fruit very well. *Calhoun*: Growing too rapidly and throwing off forms. *Chickasaw*: In some localities badly

injured by rust; boll-worms doing some injury on prairie lands, where most of the cotton is made. *Clarke*: Injured by rains. *Corington*: A full average at present. *Grenada*: Growth excessive, with little additional fruit; crop will depend greatly on the weather during September. *Lauderdale*: Nearly ruined by heavy rains; army and boll worm at work. *Neshoba*: In bad condition owing to rains and rust. *Prentiss*: Uncertain; too much cool weather and rain to mature the crop. *Rankin*: Injured by heavy rains; some complaint of army and boll worms. *Scott*: Injured 25 per cent. by heavy rains; army worm has appeared. *Tishomingoo*: Too much rain for cotton; some rust. *Yazoo*: Unless there is dry weather throughout September the bottom crop will rot and be entirely lost. *Choctaw*: Rains have made too much weed, although it has retained the forms very well. *Newton*: Injured by rains; only a few worms as yet. *Carroll*: Picking a week earlier than last year; complaints of boll-worm and caterpillars; fears of rot owing to too much rain. *Loundes*: Out short by rains and ravages of worms. *Marshall*: Shedding rapidly on the most forward portions, while the low lands are still making and maturing well. *Oktibbeha*: Injured by drought, rain, and worms. *Copiah*: Weather unfavorable; boll-worms have been destructive, and there are complaints of caterpillars and rot on bottom lands where the weed is large; only six new bales sent to market from this county up to date. *Franklin*: Will not come up to anticipations. *Jefferson*: Too much rain; rusting badly, and never saw it so universal; picking just commenced, and three weeks later than last year. *Kemper*: Shedding very much and injured by rust. *Pike*: Storm has reduced condition 10 per cent. within the last few days. *Madison*: Injured by rain and a heavy storm; much rust and shedding. *Sharkey*: Blown down by storms; rust prevailing to a great extent; worms present, but not numerous or destructive. *Simpson*: Injured fully 50 per cent. by continuous rains. *Hinds*: Damaged by rains; rust and worms in some districts; up to August 1 the most flattering prospect in ten years. *Leake*: Continued and excessive rains, the boll-worm, and the fly have reduced the condition 30 per cent. *Tate*: Not as good as last year; picking has commenced. *Holmes*: Sadly injured by excessive rains; in many places stalks are stripped of every boll and leaf as though the army-worm had been at work; much of the bottom crop is already rotting. *Jasper*: Seriously injured by excessive rains; cotton-worms in various localities, but no serious damage as yet. *Smith*: Excessive rains have done much damage. *Washington*: Young cotton much benefited by fine rains; picking ten days later than usual.

LOUISIANA.—*Bienville*: Already injured by the boll-worm, and apprehension of much greater damage. *Concordia*: Late rains have caused much shedding and rot, which seem to be general; very little top crop; much of larger cotton broken off and blown down by storms. *Franklin*: Small, and has thrown off many forms; injured some by boll rot; picking becoming general. *Lincoln*: Rust and boll-worm are now doing considerable damage to cotton. *Madison*: August too wet; picking two weeks late; blight and rust prevail to some extent. *Rapides*: Rain and wind injured the crop considerably. *Saint Landry*: The fine rains during August too late for cotton. *Tangipahoa*: Picking going on lively; condition reduced by cool nights. *East Baton Rouge*: Rust, which is more to be dreaded than cotton-worms, has damaged crop at least 5 per cent.; weather fine for picking. *Grant*: Badly damaged by drought, followed by too much rain, causing crop to shed and rot. *Calcasieu*: Rains of great benefit. *Cameron*: The best cotton crop ever known in this parish was almost entirely ruined by the great storm of August 22. *Richland*: Rains have caused much shedding of fruit and rust. *Union*: Much damage from a heavy storm of wind and rain.

TEXAS.—*Angelina*: Shedding very much. *Austin*: Drought still continues; worms and rust have injured crop; opening rapidly, and picking will be pretty well over by the last of September. *Bastrop*: Crop very light; fine rains will make a good top crop if not molested by worms. *Caldwell*: Better than last month, owing to rains. *Coryell*: Very short; cannot make over one-fourth crop. *Dallas*: Rains have improved the crop; lower bolls small and staple short; stalk growing and forming new bolls. *Gillespie*: Rains increased the percentage about 25. *Hardin*: Promises a fine yield; no worms and plenty of rain. *Navarro*: Has steadily failed during the past month; bot-

tom crop nearly all opened; middle bolls opening at half-size and top ones shedding off. *Rusk*: Much injured by continuous drought. *Titus*: Growth fine and fruited well; since the rains commenced there is a tendency to overgrowth, which will retard maturity and prevent opening of bolls. *Trinity*: Rains have brought the crop out a little; worms in large numbers in some localities. *Somerville*: Recent rains have improved late cotton. *Upshur*: Better than last year, but not as good as expected. *Burnet*: Almost an entire failure on account of dry weather. *Collin*: Drought causing it to shed. *Victoria*: Larger crop and better lint than last year; acreage less. *Waller*: Rains followed by intense heat scotched the plant, blackened the leaves, and reduced the average; worms in some fields. *Panola*: With favorable fall late rains will produce a top crop. *Wood*: At least one-third short. *Comal*: Benefited by rains. *Ellis*: In some sections will take three acres and in others eight acres to make a bale. *Harrison*: Very little damage from caterpillars and boll-worms. *Hunt*: Improved by late rains. *McLennan*: No rain since 5th of May. *Red River*: Boll-worm has been at work; crop will be short on high lands. *Bexar*: Growing rapidly under influence of late rains; should we have a late fall a heavy top crop will be made. *Cherokee*: Dry weather continues. *Fannin*: No rains; cotton maturing rapidly. *Grimes*: Smallest crop since 1873; very little has matured that bloomed since middle of July; worms reported in some localities. *Jasper*: Has been injured in quantity and quality by winds and rain.

ARKANSAS.—*Crawford*: Over an average in some portions of county, on account of local rains, but below average over the greater portion. *Jefferson*: Season favorable, and it is now above average. *Independence*: Drought continued up to August 24; crop shedding squares and bolls, and in some places the plants are said to be dead. *Prairie*: Cotton improved, and with an average season will have a very large crop. *Clarke*: Slightly affected by rust. *Ashley*: Best prospects for several years until within the last few weeks; great fears are now entertained of serious loss from rust. *Drew*: Crop fine in the eastern and southern portions of the county; suffered in other sections from drought. Caterpillars appeared too late to do much damage. *Franklin*: A full average; well fruited and unusually healthy; great many bales of new cotton have been put up and gone to market. *Garland*: Rains have caused some rust; but for this, it would have been considerably over an average this season. *Izard*: Promises a large yield, but not yet beyond the contingencies of heavy rains and frost. *Bradley*: Condition reduced by rust. *Fulton*: Best crop ever raised. *Montgomery*: Rust is injuring it. *Faulkner*: Better than for many years. *Marion*: Better than I ever saw it at this season of the year.

TENNESSEE.—*Gibson*: Looks well, though most too luxuriant. *Dyer*: Better than average. *Fayette*: Generally good, but some has been injured by rust. *Henderson*: Too much rain has caused dropping of squares. *Lauderdale*: Very promising up to two weeks ago, when heavy rains set in causing it to shed blooms and bolls; in some neighborhoods, damaged by winds. *Rutherford*: Crop spotted; the plant of an unequal size and bearing an uneven crop of bolls; rains have caused much shedding of bolls and young squares; favorable weather, with frost not earlier than the 10th of October, may give us an average crop. *Haywood*: With a favorable fall, will be the heaviest yield for many years; has been injured some by heavy rains.

CORN.

The average condition of corn for the whole country on September 1 was 95, against 93 in August, and 93 on July 1. It is somewhat better than last year, when the September average was 92.

The following table shows the summer averages for the last four years:

Month.	1876.	1877.	1878.	1879.
July	97	85	95	93
August	100	92	96	93
September	99	91	92	95

The North Atlantic States, during the month of August, show some decline, owing to cool weather. The South Atlantic States, which suffered from drought in June and July, were much benefited by rain, and the late planted will make a full crop. The Gulf States all report an improved condition during August, except Texas, where the rains came too late to be of much benefit. The crop in that State is reported lower than at any time since ten years. In the great corn-producing States bordering on the Ohio River, timely rains have greatly improved the condition. The State of Illinois reports a very high condition, viz, 105. In the States west of the Mississippi River, the condition has fallen slightly during the month, owing to drought. In many neighborhoods complaints are made of chinch-bugs, but still the average is very high and the promise is of an enormous crop. Of 1,182 counties reporting this crop on September 1, 251 report a full average condition; 328 report above; and 603 below, as shown in the following table:

States.	Average 100.	Average above.	Average below.	Total.	States.	Average 100.	Average above.	Average below.	Total.
Maine	3	.....	9	12	Texas .....	.....	1	44	45
New Hampshire	2	.....	5	7	Arkansas	5	5	19	29
Vermont	2	1	5	8	Tennessee	10	13	17	40
Massachusetts	2	.....	1	3	West Virginia	9	9	17	35
Rhode Island	1	.....	.....	1	Kentucky	16	9	30	55
Connecticut .....	.....	2	1	3	Ohio	16	9	35	60
New York	13	12	14	39	Michigan	9	2	33	44
New Jersey	8	6	1	15	Indiana	10	4	30	44
Pennsylvania	13	9	23	45	Illinois	18	43	14	75
Delaware	1	.....	2	3	Wisconsin	9	7	24	40
Maryland	4	6	4	14	Minnesota	12	25	6	43
Virginia	11	4	44	59	Iowa	5	34	11	50
North Carolina	7	16	34	57	Missouri	11	53	8	72
South Carolina	3	.....	20	23	Kansas	6	14	16	36
Georgia	6	6	57	69	Nebraska	3	18	4	25
Florida	6	2	8	16	California	3	2	2	7
Alabama	10	3	14	27	Oregon	6	1	3	10
Mississippi	6	11	28	45					
Louisiana	5	.....	18	28	Total	251	328	603	1,182

The following are extracts from correspondents:

MAINE.—*Penobscot*: Acreage increased, but unfavorable season has reduced the average; yet good weather during September will make a fair crop. *Knox*: Badly damaged by the heavy storm of the 18th August, but favorable weather may develop an average crop. *Waldo*: Well grown, but two weeks late. *Oxford*: It has a good growth, and with favorable weather there will be a large crop. *Piscataquis*: Looking finely, but quite two weeks late; if frost holds off there will be an average crop. *Sagadahoc*: Somewhat injured by wind blowing it over in exposed places; about two weeks late. *York*: Early, large, and well filled. *Androscoggin*: The August rains have brought the crop up to a standard. *Franklin*: Ten days late, but has a good growth.

NEW HAMPSHIRE.—*Sullivan*: Late, but there is a large growth. *Merrimac*: Very backward. *Cheshire*: Late and badly filled. *Hillsboro*: Looking well.

VERMONT.—*Orleans*: Very thrifty, but still green, and may be affected by early frost before it can mature. *Rutland*: Injured by continued drought. *Caledonia*: Good growth, but late.

MASSACHUSETTS.—*Berkshire*: A fine growth, but is late, and will require favorable September weather to make a good crop.

CONNECTICUT.—*New London*: Somewhat injured by severe storm, but above an average condition. *Windham*: Quite late.

NEW YORK.—*Ontario*: Ten days late, caused by severe drought during May and June. *Oswego*: Some pieces seriously affected by drought. On moist land it is in better condition. *Allegany*: Late, but growing well; some pieces ready to cut. *Saint Lawrence*: Late, owing to early drought. If we do not have early frosts there will be a fair yield. *Tioga*: The late planted will be a light crop. *Tompkins*: The early planted is doing well, but the drought has injured the late crop. *Genesee*: Late, but doing well, and if not affected by frost will make a fair crop. *Suffolk*: Heavy rain, followed by strong wind in August, blew down and injured the crop somewhat. *Erie*: Should there be no frost for three weeks the crop will average 110. *Sullivan*: About an average condition.

NEW JERSEY.—*Cape May*: Early indications were for an increased yield, but it was reduced by severe storm; there will, however, be an average crop. *Salem*: In fine condition, and a full crop indicated. *Atlantic*: The crop in this section will be a much larger one than last year. *Essex*: Doing well and bids fair to yield a good crop. *Mercer*: Injured at least 5 per cent. by late heavy storms. *Warren*: Growing well and rapidly under the influence of frequent rains. *Burlington*: A very fine prospect injured by late severe storm; the present condition is about 100. *Somerset*: Filling out well and will be considerably above an average crop, owing to fine August weather.

PENNSYLVANIA.—*Armstrong*: An average crop, greatly improved by late favorable weather. *Cambria*: Fine rains during the last month have brought up the condition beyond expectation. *Northumberland*: Late, but in fair growing condition. *Sullivan*: A good growth, but two weeks later than last year. *Wayne*: Very good condition. *Westmoreland*: Germination retarded by extreme dry weather, and much replanting was done; this, it is feared, will cause much of the crop to remain soft if frost occurs at the usual time in the fall. *Bedford*: The late crop will ear better than the early; very favorable growing weather during August. *Butler*: Late, but if not injured by early frost will make a full crop. *Fayette*: Bids fair to be the best crop made in the county for many years. *Lancaster*: Improved greatly by late rains; bids fair to be a large crop. *Lehigh*: Suffered from drought in some localities. *Montgomery*: The indications are favorable for a larger crop than for years. *Perry*: In some portions of the county the average is 120, while in others it is 30 per cent. below an average. *Tioga*: Late, owing to frost and drought. *Beaver*: The August rains have improved the crop greatly. *Berks*: Never looked better; ears large and fodder well grown. *Bucks*: Average reduced about 5 per cent. by late storm. *Elk*: A good crop. *Indiana*: Present indications good. *Lawrence*: The average has risen since last report from 50 to 80, and still improving under influence of favorable weather. *Warren*: Yield shortened by severe drought. *Centre*: Present prospect decidedly good.

DELAWARE.—*Sussex*: Injured by late heavy rains.

MARYLAND.—*Harford*: Improved very much since late rains. The Egyptian sweet corn sent by the Department is a great success, excellent for table use, and better for drying purposes than any I have ever tried. *Montgomery*: Crop saved by timely rains; the present prospect good for a very large yield. *Somerset*: The crop, from present appearances, will yield 20 per cent. above an average and nearly double that of last year. *Worcester*: Reduced at least 20 per cent. below an average by the severe storm of the 18th August. *Calvert*: Since last report rains have improved the crop greatly. *Carroll*: The late crop will be full. *St. Marys*: Late crop injured by wet weather.

VIRGINIA.—*Caroline*: The early crop somewhat injured, but the late crop will make a full average; wonderfully improved by recent favorable weather. *Craig*: A full average crop. *Halifax*: Greatly improved on high ground, and very fine crop on the flats. *Prince Edward*: Full average condition, with very favorable weather for several weeks. *Russell*: Good crop. *Sussex*: About 15 per cent. below an average, owing to severe drought succeeded by excessive rain. *Amelia*: Nearly destroyed by drought, but late rains have brought it up beyond all expectation; present condition about 75.

Augusta: A fair crop, saved by timely rains. *Campbell*: Improved beyond expectation by August rains. *Charles City*: Immensely improved by August rains, but stalks small. *Chesterfield*: Wonderfully improved by recent rains; will make three-fourths of an average crop. *Essex*: The early crop injured by drought and the late by cool nights. *King William*: Improved greatly by rains. *Hanover*: The early crop too severely injured by drought to be brought forward by late rains; there will not be more than half a crop. *Montgomery*: Notwithstanding the severe drought of early summer, the rain came in time to make an unusually fine crop. *Orange*: Since the latter part of July the season has been very favorable, and the crop has greatly improved, with its present condition at 100. *Roanoke*: Seriously injured by drought. *Rockingham*: Improved amazingly by late rains. *Dinwiddie*: Where it was well cultivated it has improved wonderfully since the rains. *James City*: Injured by June and July drought and August storms. *Gloucester*: Injured by severe drought. *Lunenburg*: The rains since July 25 have been very favorable for the crop, which now bids fair to be a full average. *Middlesex*: Seriously injured by the drought, which lasted fifty-two days, but recent rains have benefited it greatly. *Princess Anne*: Injured by drought and recent heavy storms, so that fears are entertained of only a half crop. *Pulaski*: Greatly improved by late rains. *Buchanan*: Although seriously injured by early and continued drought the late rains have brought up the condition wonderfully. *Elizabeth City*: Estimated to be damaged at least 50 per cent. by late destructive storm; other crops proportionately damaged. *Wythe*: Badly injured by late drought. *Henrico*: The rains came in time to save the late crop after nearly all hope had been abandoned. Present condition about 75.

NORTH CAROLINA.—*Pitt*: The early crop injured by drought and the late damaged by heavy storm in August; condition reduced to about 80. *Cumberland*: Looking very well, considering long drought. *Forsyth*: Greatly improved and prospect good. *Gaston*: Wonderfully improved since last report by fine rains. *Hertford*: On the 1st of August the prospect was the finest for many years, but has since been reduced by heavy storm; the condition is now 120. *Mecklenburg*: Injured by excessive rain on bottom land; the upland crop is very good. *Wayne*: Excessive drought, succeeded by severe storms, have materially injured the crop. *Yadkin*: Improved very much during the last month by fine rains and general favorable weather. *Yancey*: Never better at this season of the year. *Currituck*: It is estimated that the storm of the 18th August caused a loss of 25 per cent. to the crop. *Wilson*: Greatly improved by rains in August; will make about an average crop. *Greene*: The average for the county will be about three-fourths of a crop; the bottom lands good, but the uplands seriously injured by drought. *Iredell*: The finest prospect for years; if the bottom lands are not overflowed the crop will be enormous. *Pasquotank*: Although injured by the storm of the 18th August, the crop is still above an average. *Union*: Much improved, but not an average crop. *Wake*: Early corn did not recover after the drought. *Beaufort*: Seriously damaged by heavy storm of the 18th August. *Bladen*: Greatly improved by August rains. *Brunswick*: Badly damaged by severe storm. *Cleveland*: The continued rains through the latter part of July and nearly all of August have brought the crop to a fair average. *Gates*: Was looking very well until the late ruinous storm, which has nearly wrecked the crop. *Randolph*: Had it not been for the drought the crop would have been the largest for many years. *Warren*: Yield reduced by drought. *Alexander*: Injured by excessive rain. *Bertie*: This and other crops cut off at least one-fourth by destructive storm on the 18th August. *Haywood*: Favorable season, and condition about 125. *Jackson*: Above an average owing to very favorable weather during August. *Perquimans*: Damaged severely by heavy storm, which blew much of it down. *Lenoir*: Cut short by the storm of the 18th.

SOUTH CAROLINA.—*Clarendon*: In the greater part of the county the drought has cut the crop short at least 50 per cent. *Colleton*: Cut short one-third by unfavorable weather. *Laurens*: Very fine on bottom land, but ruined on upland by excessive drought. *Abbeville*: Very fine on low land; uplands improved by rains, but there will

not be more than half a crop. *Barnwell*: The crop was matured before the rainy season, and is short from drought. *Chesterfield*: Cut off by drought. *Fairfield*: Will be a full crop on rich bottom land, but seriously injured by drought on upland. *Horry*: Greatly improved, and will yield a full crop on good bottom land. *Lexington*: Early planted injured very materially by drought.

GEORGIA.—*Baker*: Greatly improved by late rains. *Cobb*: Since last report the crop has very greatly improved, and there will doubtless be a larger yield than for a number of years. *Dooly*: Injured by drought. *Habersham*: There will be a full crop; greatly improved by August rains. *McDuffie*: Shows to much better advantage since the fodder has been stripped off, at least 10 per cent. better than indicated by August report. *Montgomery*: Cut off more than one-third by drought. *Murray*: About half a crop was indicated first of August; since then it has been steadily improving under the influence of refreshing rains, and the prospect is now the finest we have had for years. *Towns*: Greatly improved by rains since last report; will make a full crop. *Carroll*: Recent rains have improved the crop greatly. About two-thirds of the county made the largest crop since 1860. *Coffee*: Injured by drought and worms. This latter caused the stalk to break when the ears got heavy, by boring into it just below the surface of the ground. *Fannin*: Improved since the rain beyond all expectation. *Floyd*: Rain came too late for the early crop, but the late is above an average. *Grinnell*: Remarkably fine crop on western half of the county. *Hall*: Saved by late rains. *Hart*: Upland corn materially improved by late rains, and the low-land crop is better than it has been for years. *Jackson*: Upland badly injured by drought, but low land is good. *Troup*: The late rains have made a material improvement in the crop on low land; it is now about 75. *Jones*: Greatly improved since last report, owing to a generous fall of rain; bottom land looking very well. *Liberty*: This, with other crops, improved by late generous rains. *Lincoln*: No change in figures since last report. Fifty per cent. of an average is all that can be safely counted on, and much of this is from the bottom lands and late-planted uplands. *Milton*: Unusually fine. *Talbot*: Improved in weight, but not in bulk; ears generally short, and not filled to the end. *Worth*: Almost an entire failure. *Fulton*: The finest crop made for ten years. *Gordon*: Early planted too far advanced when the rains came; the late will be a full crop. *Heard*: The present crop is much better than the last; condition, 120.

FLORIDA.—*Hillsborough*: Harvested about a month ago, and was at least 25 per cent. above an average. *Madison*: Cut off by drought and drill-worm, but enough made for home consumption. *Wakulla*: Damaged seriously by freshet. *Columbia*: Now being harvested. *Leon*: Poorest crop for several years. *Santa Rosa*: Above an average condition.

ALABAMA.—*Baldwin*: The late very much improved by recent rains, and will make a very good crop. *Clarke*: Early crop injured by drought, but the late improved by rains, and where the land was good the crop is very fine. *Monroe*: Improved by late rains. *Bullock*: The late crop materially benefited by rains. *Calhoun*: Injured by drought, but the weather has been so favorable for the last month that the crop has come up beyond all expectation. *DeKalb*: The favorable weather during August has made a decided improvement in the crop. Some fields that before the rain seemed utterly destroyed will now produce good crops. *Conceh*: Injured by drought; present condition about 100. *Saint Clair*: Much benefited by August rains. *Winston*: Greatly improved by late rains.

MISSISSIPPI.—*Attala*: Late crop better than usual in consequence of refreshing rains. *Covington*: Too far gone when the rain came to make a full crop. *Grenada*: The early crop too much injured by drought to be benefited by recent rains, but the late planted immensely improved, though this latter is the minor part of the crop; so the general crop will be short. *Norube*: Recent fine season on late planted tends to make the yield better than last year. *Tishomingo*: Very large crop. *Yazoo*: Early planted seriously injured by drought, but the late crop (which is but a small per cent. of the general crop) now gives promise of a full yield. *Pontotoc*: The prospect, a few

weeks ago, was gloomy, but the August rains have improved the crop wonderfully. *Lowndes*: Shortened by drought. *Oktibbeha*: Early crop injured by drought, the late by too much rain. *Copiah*: Condition improved since last report. *Franklin*: Owing to drought at time of maturity the crop is short of last year. *Greene*: Injured by drought in July and early part of August. *Jefferson*: Being housed and turning out very poorly. *Pike*: The present low condition is attributable to recent storm and overflows. *Madison*: Damaged by severe storm in August. *Sharkey*: Average reduced by late heavy storm. *Simpson*: Average cut down to about 75 by drought during June and July.

LOUISIANA.—*Franlin*: Under the influence of continued drought the crop has further declined. *Lincoln*: Reduced to about half a crop by continued drought. *Saint Landry*: Seriously injured by severe drought. *Washington*: Somewhat improved by late rains. *Grant*: The crop almost worthless owing to the long and severe drought. *Richland*: The crop has failed to meet the indications of August 1.

TEXAS.—*Anderson*: Damaged by heavy storm; at least one third short. *Angelina*: Cut off one half by drought. *Austin*: Short crop. *Bastrop*: Will yield from 10 to 20 bushels per acre. The quality is inferior and the ears small. *Caldwell*: Supply short; will have to import from the North this winter. *Coryell*: Being gathered; yield not over one-fourth. *Dallas*: Only half crop; caused by excessive drought. *Gillespie*: Improved by August rains, but still far below an average. *Hardin*: Below an average, owing to drought. *Live*: About one-fourth of a crop, owing to drought; other crops almost as bad. *Navarro*: Nearly all housed; but poor yield and inferior quality. *Titus*: Cut short by drought; acreage increased. *Upshur*: Injured by dry weather. *Burnett*: Nearly all gathered; ears short and grain small; 16 bushels per acre about an average. *Collin*: Injured by drought. *Victoria*: Materially injured by drought in both yield and quality. *Waller*: Average even lower than last report. *Panola*: Reduced by excessive drought, which continued from the 5th July to 26th August. *Wood*: About an average condition. *Comal*: Failure. *Baxter*: Light and not well matured. *Grimes*: Nearly all gathered, and not enough to supply the home demand. The driest year since 1860. *Jasper*: Will not exceed three-fourths of an average crop. *Nueces*: A failure; owing to drought. *San Patricio*: The little that was raised has been gathered.

ARKANSAS.—*Crawford*: All made and below an average crop. *Jefferson*: Cut short by severe drought; will not average 10 bushels per acre. *Independence*: Seriously injured by protracted drought, although in cases where the early crop was well worked it made an average. *Prairie*: Short and late. *Clark*: Will make about an average crop. *Stone*: Slightly affected by drought. *Baxter*: Prospect for a large crop. *Drew*: Will not yield more than half a crop. *Franklin*: Lighter than was expected. *Izard*: The general yield is far above an average.

TENNESSEE.—*Bradley*: Greatly improved by plentiful rainfall since last of July; present condition about 110. *Monroe*: A good season for the past thirty days, but only about half a crop. *Rhea*: Improved 20 per cent. by late rains. *Weakley*: Injured by recent storm, but still above an average condition. *Gibson*: Prospect good for a fine crop. *Grainger*: Improved about 15 per cent. since last report, but is still far below an average. *Hancock*: Being destroyed by gray squirrels. The loss from this cause will be not less than 5,000 bushels in the county. *Knox*: Improved very much since last report. *Sevier*: Since my last report there has been an abundance of rain, which has very greatly improved the crop. *Blount*: It is thought there will be about half a crop. *Dyer*: A full average condition. *Henderson*: Never better. *Lauderdale*: Damaged by late wind and rain; where the ear lies on the ground it will rot before gathering. *Loudon*: About three-fourths of a crop. *White*: Greatly improved by August rains. *Haywood*: Gathered, and is the heaviest crop raised in this county for ten years.

WEST VIRGINIA.—*Braxton*: Average; late rains improved it. *Boone*: Improved 100 per cent. since rain; though late, it will mature. *Brooke*: Doing well. *Cabell*:

Growing nicely since rain; will make a two-thirds crop. *Greenbrier*: Good prospects for a three-fourths crop since rain. *Monroe*: Extra heavy crop. *Morgan*: Vast improvement during August. *Putnam*: Very much improved by copious rain in August. *Raleigh*: Not so good as usual. *Tyler*: Improved since rain.

KENTUCKY.—*Allen*: Half crop. *Bath*: Damaged by heavy storms in August. *Boyd*: Recent rains improved it, except on poor lands where it was past redemption. *Cumberland*: Half crop; drought. *Kenton*: Greatly improved by recent rains. *Lee*: Acreage and prospects considerably better than last year. *Lincoln*: Better prospects since rain. *Mason*: Very much improved by recent rains. *Muhlenburg*: Injured by drought and afterwards by heavy rains; below average. *Nelson*: Flattering. *Shelby*: Injured by wind. *Todd*: Improved since rain. *Trigg*: Recent storms caused considerable to fall down. *Bourbon*: Favorable weather has brought it about up to an average crop. *Bracken*: Full crop. Good in the localities where it received rain. *Jessamine*: Much improved by late rains. *Montgomery*: August rains made a fine crop. *Fulton*: Was in over-average condition until blown down by heavy rain-storm August 23. *Graves*: Never better up to August 23, when it was damaged by a severe storm. *Lyon*: Greatly injured by storm August 23; considerable blown down. *McCracken*: Best crop for several years; some injury by recent storms. *Marshall*: Improved since rains. *Woodford*: Seasonable weather during August. *Carroll*: Very much improved by recent rains. *Fleming*: Greatly improved by August rains. *Metcalf*: Recent rains will make late-planted a fair crop; early-planted in some sections will not make over five bushels per acre. *Taylor*: Considerable improvement. *Washington*: Average crop, if not injured by frost. *Nicholas*: Generally late; replanted; first planting cut short by drought; second planting will be a fair crop if it escapes frost. *Pendleton*: Never saw such rapid improvement as there was in August; with a good stand crop would have gone above average. *Monroe*: Rain came too late to do the crop much good. *Union*: Crops heavy and fine; rains caused some to fall. *Johnson*: Looks better since rain. *Meade*: Injured by drought.

OHIO.—*Allen*: Some improvement since rain, but crop will be much below average. *Licking*: Poor stand; drought and insects; much of the crop is late and can only mature under most favorable conditions. *Logan*: Ten per cent. below average; defective seed. *Pickaway*: Below average; injured by storms. *Ross*: Large acreage and doing well; some fields a little late. *Darke*: Shortened by drought and injured by wind-storm August 15. *Geauga*: Growing rapidly; bids fair for an average crop. *Meigs*: Full average but late. *Montgomery*: Improved by recent rains. *Morrow*: Almost up to average. *Adams*: Much improvement during August. *Butler*: Marvellous improvement during the past four weeks. *Hocking*: A little short; worms and drought. *Lorain*: Doing finely. *Scioto*: Much improvement in August. *Warren*: Storms injured it to some extent. *Athens*: Very uneven, and much of it very late; some improvement since rain. *Auglaize*: Favorable season for the past six weeks; prospects for a fair average crop. *Clark*: Rains improved it. *Union*: Prospects for a full crop. *Mercer*: Maturing finely; very promising crop. *Sandusky*: Prospects for an excellent crop. *Harrison*: Early drought injured it, but the late rains will bring it nearly up to an average crop. *Highland*: Improved by late rains. *Hancock*: Backward; defective seed; late rains will make it nearly a full crop. *Huron*: Very good but a little late.

MICHIGAN.—*Allegan*: Drought injured it 20 per cent. *Antrim*: Very good; some fields ripe. *Barry*: Rain came too late; two-thirds crop. *Berrien*: Half crop. *Gladwin*: Late planted injured by frost August 16. *Kalamazoo*: Materially injured by drought; frost in some localities. *Lapeer*: Not filling well; drought. *Oakland*: Drought; many fields prematurely ripened and are being cut. *Tuscola*: Drought still continues. *Clinton*: Much of it is being cut for fodder; drought. *Montcalm*: Drought makes it very light crop. *Ottawa*: Poor prospect; drought. *Sanilac*: Injured by drought. *Wayne*: Drying up; being cut for fodder; no rain for four weeks. *Bay*: Drought still continues; some injury by frost in August. *Hillsdale*: Backward;

drought, cut-worms, and defective seed. *Manistee*: Drought has still further reduced the prospects. *Mason*: Suffered from drought. *Eaton*: Slight injury by frost. *Muskegon*: Very light; drought. *Van Buren*: Until August 10, promised above average; since then it has suffered by drought; some fields cut for fodder; no rain since July 10. *Cass*: Prematurely ripening; drought. *Ingham*: Injured by drought. *Ionia*: Drought. *Leelenaw*: Injured by drought. *Livingston*: Nearly ruined by drought. *Shiawassee*: No rain since July 18; frost in August; half crop. *Kent*: Light; drought. *Wexford*: Many fields partly killed by frost, August 8; warm weather and recent rains revived balance of crop to about seventy.

INDIANA.—*Bartholomew*: Late, but prospects since rain for a full average crop. *Decatur*: Shortest crop ever raised in the county. *Kosciusko*: Short crop; no rain for six weeks. *Floyd*: Abundant rains in August make the crop fine. *Ripley*: Improved during August. *Steuben*: Never better. *Dubois*: Fine rains of August will make a fine crop. *Howard*: Very backward. *Huntington*: Half crop. *Madison*: Improved very much in past six weeks; earing heavily. *Noble*: Injured by drought; no rain for two months. *Tippecanoe*: Best crop since 1874. "Times are splendid and the people prosperous, healthy, and happy; the long night of depression is gone." *Warren*: Good crop if it escapes frost; fine weather for maturing it. *Whitley*: Prospects for a full crop. *Brown*: Late planted improving since rain. *Franklin*: Improved since rain; will make average if it escapes frost. *Hamilton*: Full crop. *Marion*: Precarious condition; some fields not yet in full milk; cool nights in August; blown down some. *Pike*: Short crop. *Dearborn*: Upland late, but promises well; badly injured by flood on bottom lands. *DeKalb*: First planting good; second and third plantings will not make a half crop. *Starks*: Best crop ever raised in the county. *Clay*: Improved by recent rains. *Harrison*: Very much improvement during August.

ILLINOIS.—*Boone*: Late; large crop if it escapes frost. *Cass*: Excellent crop. *Crawford*: Short; drought. *Clinton*: Prospects for best crop in forty years. *Clark*: Largest crop ever grown in county. *Carroll*: Magnificent crop; nearly matured. *Coles*: Best prospects for ten years. *Ford*: Ten per cent. below average; drought. *Greene*: Fair average. *Hardin*: Damaged by storm August 22. *Fayette*: Splendid. *La Rue*: Prospects ruined by drought. *Lawrence*: Rains came too late to improve it. *Stephenson*: Promises a superior crop. *Vermillion*: Average crop; ground clean. *DeKalb*: Doing well; last replanting now stands a fair chance to mature. *Edgar*: Doing well, but needs rain. *Gallatin*: Damaged 25 per cent. by storm August 23. *Kankakee*: Drought of spring is now telling on late planted; large breadth replanted. *Lee*: Twenty-five per cent. largest yield ever raised in county. *Montgomery*: Late rains brought it out all right; crop will exceed any for three years. *Ogle*: Very good; maturing well. *Perry*: Damaged by storm August 24. *Saint Clair*: Weather extraordinarily good; such a season has never been known, everything seems to be on a grand boom. *Sangamon*: Will make 103 if it escapes frost. *Woodford*: Some alarm about chinch-bugs on late planted; stalks are black with them; about three-fourths of a crop is too far advanced to sustain much injury. *Hancock*: Weather all that could be desired; yield will be above average. *Johnson*: Better than for many years. *Kendall*: More than average if it escapes frost. *Mercer*: Above average. *Whitesides*: Some fields damaged by hail and wind. *Livingston*: Late rains helped it very much; will be better crop than last year's if it escapes frost. *Menard*: Will make average crop if frost holds off. *Jefferson*: Injured 10 per cent. by storms. *McLean*: Largest crop ever raised in county if it escapes frost. *Marshall*: Immense crop. *Union*: Prostrated by wind after heavy rains.

WISCONSIN.—*Buffalo*: Good crop; none better for years. *La Fayette*: Best crop for years. *Sauk*: Drying up; no rain for five weeks. *Jefferson*: Reduced 10 per cent. by drought. *Fernon*: Short; drought; rains may make a fair crop. *Columbia*: Drought shortened the crop. *Dunn*: Good prospects. *Racine*: Full average crop. *Monroe*: Drought retards it. *Richland*: Late planted hurt by drought; no rain since August 11; crop out of the way of frost. *Walworth*: Very much shortened by drought; does not fill well; will be short in weight; everything suffering for rain. *Wood*: No rain

in August; fires raging in cranberry and hay marshes. *Calumet*: Good. *Dodge*: Badly damaged by hail and drought. *Milwaukee*: Injured by August drought; well cultivated fields will give a good average crop. *Waukegan*: Injured by drought; no rain for eight weeks. *Door*: Some injury by frost. *Fond du Lac*: Not well filled; drought. *Waukesha*: Cut short by drought; but little rain since July 7.

MINNESOTA.—*Aiken*: Best crop ever raised. *Ramsey*: Splendid corn weather during August. *Mille Lacs*: Mostly out of the way of frost. *Wadena*: Average. *Kandiyohi*: Well eared and filled. *Cottonwood*: Suffered by drought; no rain for six weeks. *Jackson*: Promises No. 1 crop; nearly out of danger from frost. *Rice*: Ripening finely. *Fillmore*: Average reduced by drought. *Olmstead*: Too dry for corn. *Redwood*: Good crop; larger yield than last year. *Steele*: Good crop, well matured, and some fields ready for cutting. *Washington*: Extra crop; well matured. *Stearns*: Splendid crop. *Renville*: Heavy crop. *Isanti*: Full average crop, and ready for cutting. *Pope*: Raised only for home use; good quality and ripening well.

IOWA.—*Allamakee*: Suffering severely by drought; magnificent promise of July will not be realized. *Adams*: Continued dry weather; no rain since June 25. *Benton*: Good as ever raised in county. *Franklin*: Above average. *Jasper*: Improved amazingly since rain; now bids fair to be best crop ever raised in county. *Marion*: Drought has shortened the crop to about average. *Mills*: Injured by drought. *Tama*: Nothing can prevent a fine crop. *Calhoun*: Short; drought. *Dallas*: Drying up; no rain for two months. *Floyd*: Excellent crop; weather favorable. *Hamilton*: Heavy crop, and ripening nicely. *Hardin*: Ripening finely. *Howard*: Full of chinch-bugs, but no harm is anticipated; needs rain. *Muscatine*: Promises a heavy crop. *Clinton*: Ripening splendidly; heaviest crop for years if frost keeps off. *Decatur*: Splendid condition. *Des Moines*: Twenty per cent. short; drought. *Madison*: Short; but little rain since June 24. *Montgomery*: Injured by drought. *Jefferson*: Shortened by drought; but two light showers since July 3. *Monona*: Lessened by drought. *Sac*: Prospects since August report cut short 10 per cent. by drought. *Emmett*: Drought injured it. *Linn*: Fine condition, and mostly out of the way of frost. *Cherokee*: Most of crop out of the way of frost. *Mitchell*: Better than usual; good quality and yield.

MISSOURI.—*Audrain*: Reduced 25 per cent. by eight weeks, drought. *Benton*: Early very good; late planted damaged by drought; ground too dry to plow. *Dunklin*: Finest for twenty years. *Jefferson*: Prospects for an excellent crop. *Lawrence*: Improved by recent rains. *Putnam*: Remarkable fine prospects for all growing crops; conditions good. Business outlook good. *Cooper*: Drought will lower average to 100. *De Kalb*: Biggest crop ever raised in county; early planted now being shocked. *Montgomery*: Needs rain. *Saint Francois*: Plenty of rain in August; most of the crop is out of danger. *Platte*: Now being shocked; crop overestimated in early part of the season. *Saint Louis*: Just rain enough to keep it growing. *Scott*: Damaged 5 per cent. by heavy rains. *Washington*: Extra crop. *Lewis*: Full average crop, but not so heavy as farmers anticipated. *Lincoln*: Half crop; drought; stock suffering for water; pastures dried up. *Macon*: Never better. *Maries*: Extra good and clear of frost. *Saint Genevieve*: First planting a poor stand; replanted done well and now promises a full crop. *Perry*: Never looked so well until recent damage by storms. *Pulaski*: Best in ten years. *Stone*: Crop materially shortened by drought. *Newton*: Drought cut the crop short. *Carroll*: Early planted good but late planted shortened by August drought.

KANSAS.—*Atchison*: Needs rain. *Barbour*: Crop almost a failure; drought; grain, flour, and potatoes will have to be purchased from other counties. *Chase*: Short; drought and chinch-bugs. *Douglas*: Above average. *Ellis*: Splendid. *Franklin*: Drought and chinch-bugs shortened the crop 20 per cent. *Lincoln*: Half crop; but little rain for four months. *Kingsman*: Very dry; ground too hard to plow; many grasshoppers. *Marshall*: Heavy crop. *Montgomery*: Early planted damaged by drought, did not fill well; chinch-bugs injured late planted. *Ness*: Very poor. *Leavenworth*: No good rain for two months; crop suffering. *Neosho*: Our splendid prospects injured by drought. *Shawnee*: Good crop in every respect. *Woodson*: Badly

injured by drought; mills running on half time; wells failing and small streams dry. *Ottawa*: Drought and chinch-bugs shortened the crop. *Saline*: Reduced 10 per cent. since last report by chinch-bugs and drought. *Washington*: Cut short 20 per cent. by drought and chinch-bugs. *Mitchell*: Shortened by drought and chinch-bugs. *Marion*: Injured by chinch-bugs and drought.

NEBRASKA.—*Antelope*: Magnificent. *Knox*: Half crop; drought. *Phelps*: Some fields injured by hail. *Saunders*: Maturing rapidly; not damaged by chinch-bugs to the extent at first supposed. *Gage*: Chinch-bugs very bad; farmers afraid to sow fall wheat on account of them. *Harlan*: Badly injured by drought and chinch-bugs. *Merrick*: Enormous crop. *Cass*: Condition lowered 10 per cent. by drought and chinch-bugs. *Nuckolls*: Injured by chinch bugs.

OREGON.—*Douglas*: Looks well but is late; spring wet.

COLORADO.—*Larimer*: Superior to any previous year.

UTAH.—*Salt Lake*: Dryest season ever experienced in this Territory. *Box Elder*: Reduced by drought; irrigated fields above average. *San Miguel*: Drought still continues. *Utah*: No water for irrigation. *Tooele*: No rain since April 17; half the farmers have been out of breadstuff for several months. *Beaver*: Injured by drought and by frost August 29. *Sevier*: July rains developed the crop better than anticipated.

DAKOTA.—*Lawrence*: Light crop; cold nights and excessive rains. *Yanktons*: Some fields injured by hail.

MONTANA.—*Madison*: Best crops this county ever produced; one-third increase in acreage and one-fourth increase in yield.

INDIAN TERRITORY.—*Chickasaw*: Very poor in some sections. *Seminole*: Drought continues. *Cherokee*: Light crop; failure in some districts; drought. *Choctaw*: Continued drought; not a sufficient yield to supply the demand. *Tahlequah*: Not a half crop; drought.

TOBACCO.

The following table exhibits the condition of this crop—the gain or loss—compared with August 1, in the twelve largest tobacco States:

States.	August.	September.	Gain.	Loss.
Massachusetts.....	93	102	9	
Connecticut.....	105	100		5
Pennsylvania.....	88	100	12	
Maryland.....	85	96	11	
Virginia.....	66	82	16	
North Carolina.....	81	87	6	
Tennessee.....	73	90	17	
Kentucky.....	79	85	6	
Ohio.....	79	74		5
Indiana.....	79	90	11	
Illinois.....	99	100	1	
Missouri.....	93	88		5

The condition compared with that on September 1, 1878, is as follows:

States.	1878.	1879.	Gain.	Loss.
Massachusetts.....	109	102		7
Connecticut.....	115	100		15
Pennsylvania.....	90	100	10	
Maryland.....	89	96	7	
Virginia.....	90	82		8
North Carolina.....	97	87		10
Tennessee.....	94	90		4
Kentucky.....	68	85	17	
Ohio.....	82	74		8
Indiana.....	90	90	(*)	(*)
Illinois.....	79	100	21	
Missouri.....	87	88	1	

* No change.

From the first of these tables it will be seen that there has been a gain in each of nine and a loss in each of three States, reversing the exhibit of last month, which made a gain in but three States and a loss in nine from the July condition.

The second table shows that a loss has occurred in six and a gain in five of the large producing States, comparing the September condition this year with that of 1878, while in one, Indiana, the condition remains the same.

For the whole country the average condition is 87, showing an improvement of 10 per cent. compared with August, and of 6 per cent. with September, 1878. That this improvement has not, perhaps, equaled the general expectation is to be attributed to damaging wind-storms in some sections, and to the excessive rains that followed the long continued and disastrous drought in others.

The following notes indicate the local aspects of this crop in the several States named :

NEW YORK.—*Oswego*: Not very forward, but with late frosts there must be a good crop. *Chenango*: Extensively raised in this county; has suffered from drought; about 30 per cent. below last year. The green tobacco-worm has been very destructive this season.

PENNSYLVANIA.—*Northumberland*: Improving since late rains. *Lancaster*: Wonderfully improved by late rains. *Perry*: Very fine. *Tioga*: Largely grown in this county, and looking remarkably well.

MARYLAND.—*Charles*: Improved greatly since late rains, although in some localities it has been injured by an excess; the general crop will be short. *Howard*: Both condition and acreage below an average. *Calvert*: Injured by heavy storms in some localities, while much benefited by moderate rains in others. *Prince George's*: Short crop owing to continued rain after the drought. *Saint Mary's*: Injured by recent heavy rains.

VIRGINIA.—*Greene*: Injured by late rains on flat lands. *Craig*: An average condition. *Halifax*: A most remarkable improvement since the rains. *Pittsylvania*: Late on account of drought during June and July. *Amelia*: Improved greatly by late rains; the average condition for the county is about 75. *Campbell*: August rains saved the crop. *Chesterfield*: A small crop planted; only slightly injured. *Montgomery*: Has a large leaf, but is late and will require a good, late season to mature. *Orange*: The acreage is small and the stand bad, but the late favorable weather has brought it forward rapidly, and a late season may insure a fair crop. *Dinwiddie*: The early planted is in fine condition and will make a No. 1 crop, but at least one-half the crop was planted after the 26th July—too late to do well. *Lunenburg*: Brought up to a full average by late splendid rains.

NORTH CAROLINA.—*Yadkin*: Quite fine. *Sampson*: Never before raised for market. We now have about 40 acres under cultivation which is very fine. *Person*: Affected by drought, but the late rains have improved the crop beyond all expectation, and it is now above an average. *Warren*: Cut short by drought. *Haywood*: Season has been too dry for this crop.

ALABAMA.—*Crenshaw*: Doing very well.

TENNESSEE.—*Monroe*: Wonderfully improved by late rains. *Dickson*: In fine condition, and if not injured before maturity will make a good crop. *Dyer*: Above an average.

KENTUCKY.—*Bracken*: July and August rains brought the crop up to a full average. *Cumberland*: But a quarter crop set and that looks sorry. *Carroll*: Much improved by late rains. *Fleming*: Greatly improved since rain. *Kenton*: Improved rapidly

since rain; seasonable fall will make nearly an average crop. *Lyon*: Injured by storm August 23, but still promises well. *Marshall*: Recent rains improve it very much. *McCracken*: Very fine. *Nicholas*: But little planted, owing to a failure of plants and a season for setting them; what is growing is in good condition. *Pendleton*: Wonderful improvement during August. *Trigg*: Storm of August 23 damaged it badly. *Todd*: Very fine crop; free from worm-holes and a large acreage. *Taylor*: Material improvement during August; a little too wet for it at present.

OHIO.—*Darke*: Very much improved by late rains. *Montgomery*: Late rains improved it.

MISSOURI.—*Carroll*: Very fine; worms and grasshoppers worse than usual. *Dade*: Ten per cent below average. *Johnson*: Does not mature well. *Pulaski*: Very good; small acreage; late spring frosts caused a scarcity of plants. *Vernon*: Late but coming out finely.

WHEAT.

In our previous monthly reports we have necessarily considered the wheat crop in its two natural divisions, winter and spring. In September, after the final gathering of the crop, our correspondent gives estimates of its aggregate yield. The result of these estimates, this year, is the unexpectedly high condition of 92 against 87 last year.

There is a slight decline in New England, but the Middle and South Atlantic States show a decided improvement. The Atlantic slope, generally, enjoyed favorable conditions of growth. The improved condition of Alabama and Mississippi was more than counteracted by the heavy decline in Texas, which shows less than two-thirds of an average. Drought was very severe in the extreme southwest. Arkansas and the Ohio Valley, from Tennessee to Wisconsin, show a very marked improvement, the reports from nearly all the counties being of a cheerful tone, indicating general satisfaction. West of the Mississippi the decline in Kansas and Nebraska is more than compensated by the improvement in the other States of this region. The Pacific States fall off. The great winter-wheat States of the west report superior crops, while the spring-wheat States, though still much below the average, are in much better condition than last year.

As two additional investigations will be made it would be improper, here, to hazard even approximate figures of the final out turn of the present crop. It is safe, however, to say that present indications point to an increase over the yield of 1878.

From the subjoined notes of correspondents it will be seen that the Fultz wheat maintains its popularity. Several new varieties, lately distributed by the department, are highly spoken of, especially the "Silver Chaff."

MAINE.—*Waldo*: Very good. *Aroostook*: Greatly improved in condition since last report. *Piscataquis*: The early sowed is well filled, the late is badly rusted.

NEW HAMPSHIRE.—*Hillsboro*: Above an average crop.

VERMONT.—*Orleans*: The present crop will not supply home consumption. *Rutland*: Harvested in fine condition. *Essex*: Unusually good, and secured in fine condition. *Grand Isle*: Affected by drought. *Caledonia*: Nearly an average crop.

NEW YORK.—*Ontario*: Damaged by rains during harvest. *Oswego*: In fair condi-

tion when harvested and the grain much plumper than last year. *Allegany*: Turned out better than was expected; 3 to 5 bushels per acre more than was anticipated. *Cattaraugus*: Threshing has commenced and large yields reported; crop saved in excellent condition. *Saint Lawrence*: Winter wheat very good, about 20 per cent. above an average; spring about the same below. Spring wheat is falling off in acreage in this county. *Wayne*: Injured by rain during harvest. *Genesee*: Yielding better than was expected; about an average crop. *Erie*: The winter wheat was saved in fine condition, but little has been threshed. The yield has varied from 6 to 20 bushels per acre.

NEW JERSEY.—*Salem*: Nearly a full crop. *Mercer*: Far below the average of former years in yield, but harvested in good condition. *Warren*: Average condition, with good plump grain. *Middlesex*: The condition was a full average, but the yield about 15 per cent. below.

PENNSYLVANIA.—*Armstrong*: Good yield to the amount of straw. *Northumberland*: Good yield and fair quality, but straw short. *Sullivan*: Not turning out as well as expected. *Westmoreland*: Not as good as anticipated before harvesting. *Fayette*: Of better quality than last year. *Lehigh*: Injured by rust in early part of June. *Beaver*: Injured in stack by rain. *Bucks*: Secured in excellent condition. *Elk*: Stands light on the ground, but yields well in threshing. *Centre*: Harvested in good condition, but both the quality and product were below average.

MARYLAND.—*Montgomery*: Harvested under favorable circumstances and in good condition. *Worcester*: One-fourth short of an average yield, but the quality is fully up to the standard. *Carroll*: Turned out well where it was drilled. *Prince George's*: A little under average yield. *Saint Mary's*: Short crop.

VIRGINIA.—*Craig*: About an average crop. *Halifax*: Quality excellent and saved and in prime condition. *Russell*: Very good. *Chesterfield*: Harvested, and sold at a low figure. *King William*: More smut this season than ever before known. *Hanover*: Small yield but excellent quality. *Montgomery*: The yield small, but quality very good. *Orange*: Harvested in excellent condition; the quality fine, but the yield very poor. *Dinwiddie*: Harvested in very good condition. *Gloucester*: Affected by continued drought. *Richmond*: Preparations are being made for increased acreage this fall.

NORTH CAROLINA.—*Yancey*: Has yielded better than was expected; grain very good. The Clawson white cannot be excelled. *Warren*: Yield small, but the quality very fine. *Haywood*: Season favorable, and condition above an average.

GEORGIA.—*Dooley*: Condition a full average, and acreage increased. *Towns*: Turned out better than was anticipated. *Carroll*: Never better. There will be a much larger area sown this fall, as farmers find that wheat and oats are more profitable than any other crops, labor and general expense considered. *Jackson*: A very good crop.

ALABAMA.—*Chambers*: A fine crop.

TEXAS.—*Dallas*: But slightly over half a crop; quality good. *Titus*: Crop short, caused by drought, rust, and chinch-bug. *Somerville*: A much smaller crop than 1878, but very fine quality, free from smut, &c. *Upshur*: Large grain and fine quality. *Burnet*: All threshed; very small but round; 8 bushels per acre. *Collin*: Injured by drought and rust.

ARKANSAS.—*Franklin*: Only about 40 per cent. of an average crop.

TENNESSEE.—*Dickson*: Not a large yield, but of excellent quality. *Henderson*: Saved in excellent condition, and quality of grain very good.

WEST VIRGINIA.—*Brazton*: Largest crop and finest grain for years. *Hardy*: Yield, 14 bushels per acre, and of fine quality. *Mineral*: Lessened in yield by drought; grain excellent in quality. *Monroe*: Half crop; good grain. *Monongalia*: Headed well and yielded better than farmers expected. *Putnam*: "Fultz" supposed to be more liable to smut than other varieties. *Jefferson*: Threshing out finely.

KENTUCKY.—*Laurel*: Above average; 50 per cent. better than last year both in quality and quantity. *Lee*: Average, and prospects better than last year. *Lincoln*:

Saved in good condition. *Shelby*: Preparation for next crop one month earlier than usual. *Graves*: Harvested in good condition; grain excellent. *Washington*: Excellent quality. *Nicholas*: Above average crop; grain excellent. *Jefferson*: "Silver Chaff" from department yields 50 per cent. greater than the ordinary red varieties usually sown here. *Johnson*: Excellent. *Owsley*: Above an average crop.

OHIO.—*Allen*: Much better crop than anticipated. *Licking*: Excellent quality and yield. *Logan*: Large yield; some of the new varieties introduced by the department have helped to raise the average production to 125. *Miami*: Best crop ever harvested; average 27 bushels; "Fultz" 10 bushels ahead of other varieties. *Pickaway*: Largest yield per acre ever harvested, and of best quality. *Pike*: "Silver Chaff" from department proves to be of excellent quality and well adapted to this climate; yielded 62 pounds per bushel sown broadcast. *Ross*: Never better; Clawson over 48 bushels per acre. Fultz as high as 42½ bushels. *Trumbull*: Silver Chaff from department done well; 41 pounds raised from one quart of seed. *Ashtabula*: Best quality ever raised. *Geauga*: Yielded better than expected. *Meigs*: Better yield than expected; very few chinch-bugs. *Morrow*: Considerable above an average in quality and quantity. *Adams*: Yield nearly as good as last year; quality excellent. *Hocking*: Best yield for many years. *Lorain*: First quality. *Warren*: Magnificent harvest; average yield 25 bushels; Clawson and Fultz the leading varieties. *Washington*: Winter wheat is our leading industry. *Auglaize*: Yield better than expected. *Cuyahoga*: Good quality and yield. *Knox*: May make average. *Mercer*: Gold Medal from department is giving good satisfaction; Fultz is more prolific but not so good in quality; yielded from 26 to 40 bushels. *Sandusky*: Average yield 20 bushels. *Harrison*: Excellent yield; some fields as high as 45 bushels. *Huron*: Average yield 25 bushels.

MICHIGAN.—*Allegan*: Better yield than expected. *Antrim*: Above average. *Bay*: Average yield 24 bushels. *Clinton*: Yielding as well as last year with much lighter straw. *Calhoun*: Extra crop both in quantity and quality; yields over 30 bushels. *Lapeer*: Remarkable good yield; excellent quality. *Lenawee*: Largest yield we ever had; excellent quality. *Oakland*: Good crop; above average yield. *Tuscola*: Yielding from 40 to 48 bushels, mostly Clawson. *Muskegon*: Very good crop. *Berrien*: Bountiful crop of good, plump grain, saved in good condition. *Shiawassee*: Average. *Emmett*: Winter wheat a splendid yield; spring wheat hurt by drought, and will yield about 75 per cent. of an average crop.

INDIANA.—*Decatur*: Best crop ever produced. *Ripley*: Good crop. *Dubois*: Harvested well. *Howard*: Never in better condition. *Noble*: Largest crop ever raised, and good quality. *Tippecanoe*: Average yield 30 bushels (almost a double crop). *Whitley*: Best crop ever raised in county. "Never saw farmers feel better than they do this fall." *Starke*: Yield better than expected; averages 25 bushels.

ILLINOIS.—*Boone*: Poor; drought and chinch-bugs; winter wheat excellent, yield but small acreage. *Cass*: Best crop in twenty years. *Coles*: Thrashed in good condition. *De Kalb*: Winter wheat best that has been produced for twenty years; some fields yielded 50 bushels, lowest 25 bushels. *Edgar*: Thrashed and marketed in fine condition. *Fayette*: Good yield and quality. *Greene*: Unprecedented yield of winter wheat; quality very fine. *Hardin*: Below average yield; quality never better. *Clark*: Better yield than expected. *Putnam*: Spring wheat injured by chinch-bugs. *Odesa* has yielded better than any other variety, averaging from 25 to 40 bushels. *Richland*: Did not fill well. *Stephenson*: Good quality. *Vermillion*: Best crop of winter wheat ever grown in county; average yield 30 bushels, some fields 40 bushels, weighing sixty-five pounds. Fultz yields 5 bushels more than any other variety. *Winnebago*: Winter wheat averages from 20 to 35 bushels; spring wheat a failure, and comprises four-fifths of the acreage. From 3 bushels of Silver Chaff, sown on 1½ acres, 48 bushels very fine grain was thrashed. *Carroll*: Winter wheat averages 20 bushels No. 1 grain; spring wheat injured chinch-bugs and will not yield over 10 bushels. *Kankakee*: Yield unprecedented. *Lee*: Winter wheat yields an average of 30 bushels plump grain; spring wheat inferior quality and about 10 bushels yield. *Montgomery*:

Largest crop ever raised; excellent quality. *Ogle*: Small acreage winter wheat but heavy yield; light crop spring wheat; chinch bugs and drought. *Hancock*: Yield very large. *Henry*: Spring wheat poor; winter wheat good yield, but small acreage. *Iroquois*: Never had a better yield or quality. Silver Chaff from department proves a valuable acquisition; 2 bushels from one quart of seed. *Madison*: Good quality; some fields injured by weevil after stacking. *Whitesides*: Severe damage by rain in shock and stack. *Livingston*: "About played out." *Marshall*: Best crop in many years. *McLean*: Never was a better crop fall wheat; spring wheat not so good.

WISCONSIN.—*Buffalo*: Better quality than last year. *La Fayette*: Winter wheat never better. *Jefferson*: Spring wheat does not yield as expected; averages 12 bushels, quality No. 2; Fultz general favorite. *Juneau*: Secured in excellent condition; winter wheat averages from 25 to 28 bushels, spring 10 to 15 bushels. *Vernon*: Some injury by rust. *Dunn*: Average yield 10 bushels, fair quality. *Douglas*: Winter wheat injured by rust; increased acreage will not supply the deficiency in yield by 30 per cent.; Silver Chaff from department very fine. *Grant*: Winter wheat averages from 20 to 40 bushels; spring, 8 to 15 bushels. *Monroe*: Excellent. *Pepin*: Badly hurt by chinch-bugs and blight; average yield from 3 to 10 bushels. *Walworth*: Spring wheat averages 14 bushels. *Dodge*: Good quality winter wheat very good. *Milwaukee*: Better yield than expected. *Outagamie*: Secured in good condition; excellent weather during harvest. *Polk*: Yield not so good as anticipated before harvest. *Washington*: Winter wheat extra good, acreage small, average yield 25 bushels; principal injury to spring wheat was caused by an insect in the heads, first seen here about a year ago, and generally supposed to be weevil, but I think it is the "wheat-midge"; eggs laid by a fly at blossoming time, and hatches into a worm having the appearance of a flax-seed; average yield, 10 bushels. *Crawford*: Winter wheat sowed in good condition, and was a big crop; spring wheat an average crop; largest acreage for years.

MINNESOTA.—*Benton*: Condition lowered just before harvest by wind and rain storm. *Cottonwood*: What has been thrashed yields from 6 to 10 bushels. *Freeborn*: Never stacked in better condition. *Isanti*: Yield poorer than expected; grain light in weight. *Jackson*: Blighted badly; yield, 10 bushels; quality good. *Kandiyohi*: Did not fill well, and is light in weight. *Wadena*: Injured in shock by wet. *Nobles*: Poor year for wheat; drought, followed by wet weather, blight, rust, and grasshoppers. *Polk*: Yield from 10 to 15 bushels, instead of 20 to 25, as expected before harvest. *Ramsey*: Short in yield; more blight than supposed. *Meeker*: Rust injured it; will not average over 10 bushels. *Rice*: Yield will not exceed 12 bushels; considerable will grade No. 1. *Dodge*: Average yield about 10 bushels. *Fillmore*: Quality from fair to good; average yield will fall below 10 bushels. *Nicollet*: Will not average over 12 bushels. *Olmsted*: Averages 11 bushels. *Redwood*: Averages 10½ bushels; better quality than last year. *Steele*: Good quality; averages 11 bushels; one instance reported where yield was largely increased by use of salt. *Washington*: Yield 11 bushels, mostly No. 2. *Le Sueur*: Injured in some localities by severe storms. *Stearns*: Yields 17 bushels No. 1 grain. *Lyon*: Yields from 6 to 15 bushels; weight, 56 pounds. *Renville*: Late sown rusted some; average yield, 7½ bushels. *Todd*: Spring wheat badly broken down; drought lessened yield; thrashed out 12½ bushels. *Winona*: Poor crop; average yield, 8 bushels, mostly No. 2. *Pope*: Yield not quite so good as expected; rust in some places.

IOWA.—*Allamakee*: Average yield 7 to 8 bushels good quality grain. *Benton*: Light crop; yield 8 bushels good quality. *Calhoun*: Averages 15 bushels good plump grain. *Emmett*: Yield not so good as expected. *Franklin*: Turning out as well as expected. *Sioux*: Destroyed by grasshoppers. *Tama*: Better yield than expected before harvest. *Floyd*: Yield not so good as expected. *Hardin*: Averages 15 bushels. *Howard*: Falls short one-third of expected yield. *Taylor*: Winter wheat full crop; spring wheat about 80 per cent. of a crop. *Decatur*: Mostly taken by chinch-bugs. *Mitchell*: Yield 11 bushels, grades 2 and 3, mostly the former. *Cherokee*: Weighs heavier than usual.

MISSOURI.—*Adair*: Average yield 20 bushels. *Dunklin*: Not a full crop but quality

good. *Grundy*: Better yield than expected. *Laurens*: Full average. *Vernon*: Full yield. *Warren*: More raised than last year; average yield 12½ bushels. *Gasconade*: Splendid. *Johnson*: Average yield 12 to 13 bushels. *Maries*: Fine crop. *Saint Genere*: Good average yield; perfect grain. *Perry*: Extraordinary yield; good quality; Fultz leading variety. *Pulaski*: Averages 11 bushels. *Cedar*: Good quality but poor yield. *Newton*: Average yield 12 bushels; some of it is rusted and shrunk.

KANSAS.—*Atchison*: Yield better than anticipated and not so badly damaged in shock by rain as was supposed. *Crawford*: Heavy yield. *Ellis*: Less than half crop; drought. *Ness*: Poor. *Sedgwick*: Average yield 8 bushels; for the past eight years fall wheat has been our best crop, but drought came near making it a failure this year. *Montgomery*: Yields better than expected. *Shawnee*: Average yield of fall wheat 15 bushels heavy grain, and grades 3 and 4; spring wheat poor. *Ottawa*: Drought and chinch-bugs greatly reduced average; spring wheat a failure. *Washington*: Winter wheat averages 10 bushels good grain; farmers think of ceasing to raise spring wheat on account of chinch-bugs; Fultz and Rocky Mountain are the leading new varieties; drilled yields a third more than broadcast. *Mitchell*: Shortened by drought and chinch-bugs. *Johnson*: Yield better than expected. *Bourbon*: Yielded better than expected; quality No. 1. *Osage*: County alive with chinch-bugs.

NEBRASKA.—*Antelope*: Half crop; quality No. 2. *Greeley*: June drought cut the crop short 40 per cent. *Harlan*: Falls far short of our expectations. *Merrick*: Injured by chinch-bugs and drought; first chinch-bugs in twenty years. *Phelps*: In some localities injured by hail. *Sarpy*: Injured by chinch-bugs. *Platte*: Yields from 5 to 8 bushels. *Hamilton*: Ten per cent. below average. *Cass*: Yield not so large as expected; quality good.

NEVADA.—*Esmeralda*: Never looked better.

COLORADO.—*Larimer*: Average yield 38 to 40 bushels fine grain.

OREGON.—*Benton*: Half crop; rust. *Clackamas*: Winter and early sown spring full average, both in quality and yield; late sown spring badly rusted. *Multnomah*: Favorable season; large yield. *Wasco*: Acreage increased one-fourth, but crop reduced in yield by fire blight. *Marion*: July 25 the crop was far above average, but since then spring wheat (largest portion of crop) has rusted badly; some fields almost destroyed. *Lane*: Spring wheat severely injured by rust; fall wheat is good; Golden Straw averages from 25 to 28 bushels per acre. *Linn*: Fall wheat average crop; spring wheat badly rusted. *Polk*: Lowered from 125 to 80 by rust; the first of any note since 1844. *Coos*: Intermediate sown badly damaged by rust early and late; very little affected. *Douglas*: Badly rusted; thousands of acres will not be worth cutting. *Columbia*: Badly rusted. *Washington*: Spring wheat not over a half crop; badly rusted.

CALIFORNIA.—*Humboldt*: Crops of all kinds are good. An insect resembling the cabbage louse has injured some late sown grain. *Sonoma*: Hot weather preceding harvest shriveled it some. *San Joaquin*: Much better yield than expected. *Yuba*: Injured by rust on lowlands. *Del Norte*: Some damage by rain in harvest. *Plumas*: Injured by rust.

UTAH.—*Box Elder*: Irrigated fields are over an average; dry farming did not pay this year on account of drought; some injury by frosts. *Cache*: Full average.

DAKOTA.—*Bon Homme*: About ruined by drought, followed by dry, hot winds in July. *Lawrence*: Generally sound and good; a few pieces touched with frost.

NEW MEXICO.—*Taos*: All crops suffered severely by drought which has prevailed since March 1.

WASHINGTON TERRITORY.—*Clarke*: Ripening later than usual; slight injury by hot, dry weather.

ARIZONA.—*Yavapai*: No crops except by irrigation; no rain from March to July 27; county will not produce enough to support itself.

POTATOES.

The condition of potatoes as returned September 1 shows a slight decline from the August return. The average of the whole country is 95 against 97 last month; as compared with last year there is a great improvement, the average then, at the same time, being only 73.

In the New England and Middle States, which States in 1877 produced 48 per cent. of the crop of the whole country, the average is very high. In the States north of the Ohio River the crop does not promise to be a full one, but still is very much better than last year.

Drought is the general complaint in all the West. Insect injuries are noted principally in Kansas, in which State the drought is reported as very detrimental.

BUCKWHEAT.

In the New England States the crop promises well. In New York and Pennsylvania, two States that raise two-thirds of the whole crop, the average is very high. In the States north of the Ohio River the average is low on account of the drought. Michigan, which raises more than any Western State, reports a very destructive frost in the last of August. Wisconsin reports the same. The condition for the whole country is 98, somewhat better than last year.

SORGHUM.

The returns to September 1 indicate a high condition, and 95 against 84 for last year. In all the Southern States, except Texas, the condition is good. Many correspondents are enthusiastic regarding the Early Amber variety. In the Northern and Northwestern States the condition is high. (See table.)

Table showing the condition, &c., of crops on the 1st day of September, 1879.

States.	CORN.	WHEAT.	EYE.	OATS.	BAR- LEY.	BUCK- WHEAT.	POTATOES.	TO- BACCO.	COT- TON.	SORGHUM.	SUGAR- CANE.	APPLES.	PEACHES.	GRAPES.	STOCK HOES.
	Average con- dition Sep- tember 1.	Average con- dition when harvested.	Average con- dition when harvested.	Average con- dition when harvested.	Average con- dition when harvested.	Average con- dition Sep- tember 1.	Average con- dition Sep- tember 1. (Solana in tuberosum.)	Average con- dition Sep- tember 1.	Average con- dition Sep- tember 1.	Average con- dition Sep- tember 1.	Average con- dition Sep- tember 1. (No sorghum.)	Average con- dition Sep- tember 1.	Product com- pared with an average.	Average con- dition Sep- tember 1.	Number for at tening compared with last year. (Answer in hundreds with other questions.)
Maine	91	101	101	101	101	98	98					88		80	94
New Hampshire	88	98	98	98	101	100	100					81	105	91	97
Vermont	91	92	91	90	90	98	98					81		94	94
Massachusetts	93	103	93	103	90	97	97					77		85	97
Rhode Island	100	103	93	103	90	110	110	102				70		100	100
Connecticut	101	103	96	97	95	123	123	100				63	95	115	105
New York	100	92	91	91	95	100	102	98				63	94	101	92
New Jersey	104	95	96	96	98	96	96	91				66	75	94	95
Pennsylvania	95	92	91	95	98	102	99	97				82	91	95	93
Delaware	98	98	100	99	95	102	90	93				86	67	90	100
Maryland	102	102	93	95	95	95	94	96	84			82	100	100	93
Virginia	86	93	95	95	95	95	94	82	83			93	95	100	97
North Carolina	92	94	99	93	95	98	92	87	88			86	100	100	98
South Carolina	79	93	100	105	105	95	95	88	81			80	17	80	97
Georgia	88	106	100	93	100	89	88	88	82			64	48	91	101
Florida	80		100	100	100	97	97	101	85	94		90	88	98	102
Alabama	93	100	99	100	100	91	91	90	83	84		65	43	101	100
Mississippi	94	94	94	94	94	95	95	91	98	87		60	48	87	99
Louisiana	78		87	87	87	90	90	88	80	88		80	61	81	95
Texas	56	65	77	75	75	75	75	66	66	66	72	72	56	86	91
Arkansas	85	76	84	84	84	90	92	89	90	95		66	55	90	94
Tennessee	94	106	97	90	90	85	90	94	107	94		49	28	102	92
West Virginia	96	96	97	79	79	102	92	75	85	92		58	16	80	90
Kentucky	92	102	94	97	91	94	95	85	85	92		40	40	83	91
Ohio	91	110	100	89	94	93	91	94	74	90		50	40	80	89
Michigan	84	102	96	94	93	73	78	90	90	90		66	33	88	96
Indiana	89	115	100	87	97	92	84	95	90	94		60	6	87	93
Illinois	105	100	100	81	91	93	83	97	100	100		73	5	90	90
Wisconsin	92	94	90	101	97	85	104	97	97	90		73	5	87	96
Minnesota	103	80	98	103	97	97	97	97	97	102		73	5	87	96
Iowa	104	88	97	93	90	88	97	97	97	90		73	5	87	96
Missouri	111	103	97	93	90	88	97	97	97	102		73	5	87	96
Kansas	102	74	83	73	78	80	92	88	88	88		53	12	92	93
Nebraska	118	82	85	87	70	98	91	102	91	101		67	26	101	97
Colorado	90	88	80	89	83	70	72	100	100	100		67	26	98	108
California	100	88	100	96	99	90	102	100	94	100		101	90	90	105
Oregon	94	80	102	109	102	90	103	94	94	100		84	91	100	103

DEPARTMENT OF AGRICULTURE.

SPECIAL REPORT—No. 18.

TEA-CULTURE AS A PROBABLE AMERICAN INDUSTRY.

BY

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TEA-CULTURE AS A PROBABLE AMERICAN INDUSTRY.

Tea has been used by the Chinese from remote antiquity. It is related that it was in general use in China about the year 600, and that it was introduced into Japan early in the ninth century.

The first introduction of tea into Europe is claimed for the Portuguese, who, about 1577, commenced a regular trade with China. In 1664 the East India Company had about 2 pounds of tea sent to England as a present to the King, which would indicate that the article was considered a rarity. It had, however, been introduced into England previous to this, for, in a newspaper in the British Museum, dated November 23, 1651, is found the following advertisement: "That Excellent, and by all Physitians approved, China Drink, called by Chineans Tcha, by other nations Tay, alias Tee, is sold at the Sultanness Head, a Cophee-house in Sweetings Rents, by the Royal Exchange London." Pepys also mentions in his diary, under date September 25, 1660: "I did send for a cup of tea, a China drink, of which I had never drank before." Again, in 1667, he further alludes to it, and by this time he had introduced the herb into his own house, for we find the entry thus: "Home, and there find my wife making of Tea, a drink which Mr. Pelling, the potticary tells her is good for her cold."

For nearly twelve centuries the world's supply of tea was furnished by China and Japan.

The tea-plant, *Thea viridis*, is a native of Asia, but it has not been found in a really wild state except in Upper Assam. Although the vast Empire of China has not been so thoroughly explored by botanists as to warrant the assertion that it is not growing wild in some portion of that country, yet it has not been found there except in a cultivated state, or as having evidently escaped from cultivation in stray plants found on roadsides and waste places.

As far as ascertained, the first announcement of the tea-plant being indigenous in Assam was made in 1823; but owing to imperfect specimens of the shrub having been forwarded to botanists, it was not considered to be a true species of tea. This was not fully demonstrated until 1835, when the plant, with perfect flowers and seeds, was obtained, which proved it to be a genuine tea, very closely allied to, if not identical with, the tea of China, the exclusive source of all the varieties and shades of the teas of commerce.

The discovery of the tea-plant in Assam led to the supposition that its culture and manufacture could be made a profitable industry in that country. Consequently, in 1839, a joint-stock company with a large

capital was formed in London for bringing the tea-forests of Assam, as they were called, into cultivation. In 1840 they commenced operations on a very extensive scale; extravagant expenses were incurred under the idea that the profits of tea-culture would be so great as to render any attempts at economy altogether unnecessary.

This company, having by reckless management thrown away one million of dollars, was brought to the verge of bankruptcy. Better counsel and more economical management having prevailed, the success of the enterprise was subsequently established. The teas manufactured from the Assam plant were at first rejected by the London brokers, but more care having been given to the manipulation of the leaf, and to other processes of manufacture, the product brought higher prices than the finest Chinese teas. This gave an impulse to the new industry in Assam, which soon spread to the Himalaya slopes and to other parts of British India.

The unfavorable reports made upon the earlier samples of Assam teas suggested the propriety of introducing the Chinese plant; accordingly tons of seed were secured and large plantations were formed with the plants raised from these importations. Thousands of plants were also shipped from China for the same purpose, all of which is now much regretted, as the true Assam plant is said to furnish a better class of teas; the plant is also more prolific and amenable to culture than are the plants from Chinese varieties.

Botanists who consider that the Assam tea is a distinct species have given it the name of *Thea Assamica*, to distinguish it from the *Thea viridis*, the Chinese species. There are others, however, that recognize only one species, and hold that the Assam plant is the wild type of the Asiatic tea, and that all the plants under cultivation are but varieties caused by climate, soil, and special culture.

Planters distinguish many points of difference between the Chinese and the Assam plant. The Assam grows much quicker than the Chinese plant; this renders it more profitable, as it affords a greater number of pickings during the growing season. When full grown the leaf measures 9 inches or more in length. The leaf of the China plant seldom exceeds 4 inches in length. The Chinese plant is much hardier and will succeed at higher elevations than the Assam; it is also more prone to produce seed, which is injurious to its value as a leaf-producer. The leaf of the Assam plant does not harden so quickly during growth as that of the China, which is an important consideration in picking the leaves, and, finally, the teas made from it are superior to the Chinese.

It is said that most of the Indian plantations are composed of crosses between the Chinese and the Assam plants, so that no plantation is wholly made up of the indigenous kinds, but it is conceded that the nearer each plant approaches to the indigenous, the higher is its excellence, and that it would have been better had China seed never been introduced into the locality.

The Indian tea now sells from 12 to 25 cents per pound higher than the Chinese. The imports of Indian tea into Great Britain for the year 1877 was 31,882,000 pounds.

I have introduced so much concerning the Indian operations, because it is to India that we must look for examples to be followed in our efforts here, rather than to China or Japan, as will be further noticed.

With regard to the introduction of the tea-plant into the United States, the earliest notice which has come under my observation is contained in the following extract taken from the *Southern Agriculturist*, published in 1828:

I find that the tea-tree grows perfectly well in the open air near Charleston, where it has been raised for the last fifteen years at M. Noisette's nursery. Tea, as exported from China, would cost too much in the preparation, for each leaf goes through a particular process there. But, as this is probably done with a view of economizing room and preserving its freshness in the long sea voyage to which it is exposed, we might, in raising it as a crop, use it and export it, at least northwardly, dried in the same manner as senna or hops.

This suggestion about drying the leaves for transportation has recently been revived. It is not improbable that the dried leaves, pressed in cakes, may become an article of interior commerce, and be subjected to the roasting process like coffee just previous to use, a method which would increase the aroma, if found practicable in ordinary domestic practice.

Another historical effort to introduce tea-culture into this country was made about 1848, by Junius Smith, at Greenville, S. C. Although commenced with some degree of enthusiasm the plantation never was increased to any extent, neither was it ever brought to a condition, as far as can be ascertained, to warrant the formation of any reliable opinion as to the practicability of the culture of tea; nevertheless, the circumstance of the failure is often quoted as a proof that tea cannot be grown profitably in this country. It is safe to say that as a test of tea culture the effort was of no value whatever, and never was so considered by those conversant with its management.

During the year 1858 the United States Government, through the Commissioner of Patents, ordered and received about 10,000 tea-plants from China. These were transported in Wardian cases, the cases being filled with soil, in which the seeds were sown just previous to shipment. These vegetated during the voyage, and the plants averaged 18 inches in height when taken out of the cases in Washington.

These plants were immediately placed under propagation, and in a short time the stock was increased to 30,000 plants, which were distributed throughout the Southern States. The propagation and dissemination of tea-plants formed a prominent feature in the operations of the Agricultural Division of the Patent Office until the commencement of the war, which put a stop to such communications for several years.

The Department of Agriculture was organized during the year 1862.

For some time after its establishment but little attention was given to the propagation of the tea-plant; still, it was at no time entirely abandoned. It was fully understood that, so far as the growth of the plant was concerned, it could be successfully cultivated over a large extent of country; but, sharing in the belief that the amount of manual labor required in the manipulation and preparation of the leaf (as practiced in the oldest tea-growing countries, and which was considered to be indispensable) was so great as to preclude the idea that we could compete with the low-waged Asiatics, no special efforts were made to disseminate the plants, or to increase them further than to supply such applicants as desired to make experimental tests.

Meanwhile the progress of tea-culture in British India was watched with interest; the successful results of improved methods of manufacture, and the introduction of the various labor-saving processes which were being made from time to time by the planters in that country, suggested the probability that the production of tea might be made a profitable industry in some portions of this country where labor-saving appliances usually followed closely upon the knowledge of their necessity.

Consequently fresh supplies of seed were imported from Japan, which resulted in enabling the Department to disseminate many thousands of plants. These efforts were materially enhanced when, about 1867, it was found that an abundance of tea-seeds could be procured in some of the Southern States from the plants which had been distributed from the importation of 1858.

For several years after 1868 the Department distributed annually from 5,000 to 10,000 plants, reaching in 1876 to over 20,000 plants. By this means it was expected to popularize the culture of tea as a domestic product, with the hope that public interest would in time be directed to its cultivation as an article of commercial value.

Encouraged by reports of successful culture, which were in many instances supplemented by samples of manufactured tea of undoubtedly good quality, more decided and energetic efforts were made towards establishing this industry, and during the past two years more than 100,000 tea-plants have been distributed, and the Department has under preparation at the present time at least 120,000 plants which will soon be ready for dissemination in localities where they are most likely to succeed.

The cultivation of the tea-plant is as simple as that of a currant or gooseberry, and when cultivated for its leaves it soon assumes the appearance of a low-spreading bush; although, if left to its natural proclivities, it reaches the size of a slender tree from 15 to 20 feet in height.

Tea-plantations are established in a similar manner to those of other economic plants. The uncertain method of trying to secure a uniform plantation by dropping the seeds at the spots in the field where the plants are to be permanently located is sometimes adopted, but the

most satisfactory mode of establishing a plantation is to sow the seeds in nursery rows, and when the plants are of sufficient size they are removed and planted in their permanent sites. They will reach to a height of 8 to 12 inches in one year, and are then strong enough to bear transplanting. It may be mentioned that the seeds require to be covered with about one inch of soil, and shaded from the sun. This is absolutely necessary, otherwise the young points of the plants shrivel up as soon as they emerge from the soil. After various attempts we find that a covering of short hay spread rather thickly over the seed-bed is the best protection; the young plants gradually push through this covering as they grow.

The best soil for tea is a deep rich loam, such as is found in our best garden soils. I am convinced that the soil cannot well be too rich for profitable culture of tea, provided it is properly underdrained. Any attempts to grow it on poor soils will result in absolute failure, so far as profit is concerned.

The plants are usually placed in rows which are 4 to 5 feet apart, the same distances being allowed between the plants in the rows. For convenience of culture I would prefer placing the rows 6 feet apart, and the plants 4 feet from each other in the rows. For the first two or three years some crop, such as potatoes, may be planted between the rows, and probably higher growing crops, such as corn or cotton, might be grown, the shade and shelter thus obtained being favorable to the growth of the young tea-plants.

Even under the most favorable conditions for growth no leaves should be gathered until the fourth year from planting. Picking the leaves for tea has a tendency to weaken the plants, hence they should be robust, healthy, and well established before picking commences. Much of success in the management of a plantation depends upon the discrimination used in picking lightly from weak plants, or in passing them altogether for a season, thus enabling them to acquire additional strength.

The pruning of the tea-plant is also of some importance. During the period of preparatory growth, that is, during the first five years, an annual inspection should be given the plants in early winter for the purpose of cutting back all strong shoots that seem to impair the shape of the plant, the object being to secure a bushy, much-branching habit, which is favorable to producing the greatest quantity of the most desirable kind of leaves.

Whenever a plant becomes weakened by the periodical removal of leaves, it can be restored to vigor by thinning out many of the branches, and cutting the whole of them quite close down during winter. This will be followed by a more vigorous growth the following summer, which should not be checked by picking any of the leaves, or otherwise retarding the growth during the season, thus increasing the root-growth for future extension of shoots and leaves.

When the plants have gained a proper size to furnish a crop, and the

young shoots have expanded a sufficient quantity of leaves, the leaf-pickers commence work ; an operation which is thus described :

Each individual has a basket slung at the back, and with both hands speedily strips the shoots of the leaves required, taking care not to injure the auxiliary buds, as they have to yield the next crop. The leaves, as collected, are thrown over the shoulder into the basket. A good picker will sometimes collect 50 pounds of green leaves in a long day's work, but the average is about one-half of this. Four pounds of green leaves make about one pound of manufactured tea. The earliest spring pickings make the best teas. These yield the famous Young Hyson. At this period the leaf is very thin, having a large proportion of juices as compared with the solid matter, and is dried of a greenish color, retaining a most delicate flavor. This grade of tea seldom reaches distant markets, as it speedily ferments if put up in masses for ordinary shipment, and can only be conveyed in small quantities by land routes. This superior article may be said to be unknown in this country, and it is one of the luxuries in store for us when tea-culture becomes one of our industries.

After this first gathering the plants will soon again be covered with young leaves, especially if moist weather prevails. A rainy season at this period is of the greatest value, and in its absence irrigation may be introduced with the best results. Copious rain-falls during May and June insure an abundant crop, and characterize a climate well adapted for the culture of tea. The pickings continue more or less during the season of growth ; they are influenced by rain-fall, condition of soil, and heat. A rich soil, where the rain-fall is copious, will further the growths so as to afford from 16 to 20 pickings during the season. Sometimes the conditions will be such as not to produce the half of this.

With regard to climatic essentials, the tea-plant will withstand a zero cold without material injury, but it is most profitable in climates where the thermometer seldom shows more than 6 or 8 degrees below the freezing point. Teas are made in much cooler climates, but the growing season is too short for producing many profitable pickings. But by far the most important climatic condition is the amount of rain-fall. A dry climate is altogether unfit for tea-culture. A hot, damp climate is best. The rain-fall in the most profitable tea-districts of India is from 80 to 100 inches per annum, and the more of this that falls in the spring months the better. It is doubtful whether tea can be profitably grown in this country in any district where the rain-fall is below 60 inches per annum ; and that, too, must be pretty equally diffused over the spring and summer months. Where irrigation can be systematically introduced, the rain-fall is of less importance.

The manufacture of tea as at present conducted is a very particular operation. Much of supposed value of the article depends upon the uniform accuracy with which the various processes are conducted. It is said that the value of teas is fixed after they are delivered to the

brokers, and that the character of the article from the same plantation is far from being uniform from year to year. This is more particularly the case with the Chinese teas, and is largely attributed to the routine nature of the methods employed, as contrasted with specific and exact systems.

The planters in India soon discovered that they could not profitably follow the various minute processes and details practiced by the Chinese, and they set themselves to study the philosophy of the whole subject of the preparation of the tea-leaf for market. The result has been that many operations which were formerly considered necessary have been much reduced. Instead of following a Chinese method which involved twelve operations occupying three days, the best teas in India are made by five operations which are completed in two days.



The method of picking the leaves and the routine of manufacture as practiced in India, is described as follows :

Referring to the diagram which represents a young shoot, the grades of tea manufactured from the different aged leaves are thus named: *a*, Flowery Pekoe; *b*, Orange Pekoe; *c*, Pekoe; *d*, Souchong 1st; *e*, Souchong 2d; *f*, Congou. Mixed together, *a, b, c*, Pekoe; *a, b, c, d, e*, Pekoe Souchong.

If there be another leaf below *f*, and it be taken, it would be Bohea. Fine tea can be made of the young succulent leaves only. The younger

and more succulent the leaf the better tea it makes. Thus *a* will make more valuable tea than *b*, *b* than *c*, and so on; *e* is the lowest leaf to make tea from, for, though a very coarse kind can be made from *f*, it does not pay to take it. The stalk also makes good tea, as far as it is really succulent, that is, down to the black line just above the figure 2.

The value of tea is increased when it shows Pekoe tips. Only the leaves *a*, *b*, make these. They are covered with a fine silky whitish down, and if manufactured in a particular way make literally white or very pale yellow tea, which, mixed with ordinary black tea, show as Pekoe tips. In ordinary leaf-picking these two leaves are taken with the others, but when manufactured with them they lose this white or pale yellow color and come out as black as the rest.

The operations of tea-manufacture are classified in the following sequence:

1st. Withering the leaf; 2d, rolling; 3d, fermenting; 4th, sunning; 5th, firing.

Now, to make the best quality of tea, each one of these processes is carried to a certain point and no further. Unwithered or underwithered leaves break in the rolling, and give out large quantities of a light green-colored juice during the process. The tea is much broken, and of a reddish gray color. The liquor is very pale in color, weak, soft, and tasteless. Overwithered leaf, on the other hand, takes a good twist in the rolling, gives out but little juice, which is of a thick kind, and of reddish color. The tea is well twisted and blacker than ordinary; the liquor of an ordinary depth of color, but with a mawkish taste.

There are several tests to show when leaf is withered. Fresh leaf squeezed in the hand, held near the ear, crackles, but no sound should be heard from withered leaf. Withered leaf pressed in the palm of the hand retains the shape into which it has been pressed. The stalk of withered leaf will bend double without breaking. Properly withered leaves are like old rags to lay hold of, and no further test, after experience, than the feel of the leaf is necessary.

The rolling of the leaves is for the purpose of twisting them, and also for the removal of a portion of the juice. This, however, is said to detract from the value of the tea, and one of the reasons why India tea is stronger than Chinese tea, is that in India the sap or juice is generally retained, while in China it is allowed to run off. The rolling is partly done by machinery, but finished by hand; but even when done solely by hand, an expert can finish 30 pounds in one day. Hard rolling gives darker colored and stronger liquor than light rolling. Hard rolling destroys Tekoe tips, inasmuch as the juice expressed stains them black. These tips are the small unopened leaves which, when not stained, are seen in Pekoe tea as whitish or orange-colored particles or ends. Light-rolled tea has more of these tips than hard-rolled, but hard-rolled tea is blacker and better, with the exception that the color of the Peko tip is lost.

When the rolling is finished the tea is left in rounded balls, which are allowed to remain for a time to ferment. The time allowed for fermentation is only learned by experience. There is no time to be fixed for the fermenting period. It is quicker in warm than in cool weather. The fermentation is stopped by breaking up the ball and spreading out the leaves very thin.

It is then spread out on mats exposed to the sun. This is termed the sunning process. It is turned over, so that the whole of it may be affected by the sun. With bright sunshine, about one hour's exposure is sufficient. It is then ready for the final process of firing.

Until lately it was considered essential that the heat for the final drying or firing the tea should be derived from burning charcoal. It was asserted that the fumes of charcoal were necessary to make good tea, but it is now settled that the only effect of heat is to drive all the moisture out of the roll, and heat from any source serves the purpose.

The firing is done by furnaces, which are heated by any kind of fuel, and it is claimed that it has many advantages over the old charcoal method. It is more economical, cleaner, and safer, in fact better every way, another evidence that tea-manufacture is not the mysterious, complicated process that for centuries it has been supposed to be.

After the leaves are quite dry and crisp it is called tea, the manufacture being completed for black tea.

It is perhaps unnecessary to repeat that green and black teas are made from the same plant. The fact that in certain districts green tea is made exclusively, and in other districts only black teas are made, has been adduced in support of the supposition that the plants producing them are distinct. The reason is, that those who make black teas do not necessarily have the conveniences for the manufacture of green teas; hence certain localities will be occupied by green-tea manufacturers, and they confine themselves solely to that kind. Something will also be attributable to climate and soil; small leaved varieties of the tea-plant, and a rapidly elongated succulent growth, are best for green teas, and the Chinese tea-plants are better for green-teas than the Assam plants, which are of a more robust growth.

In the manufacture of green tea the leaf is not withered or fermented, but as soon as the leaves are picked they are placed in pans which are heated to about 160 degrees Fah. Here they are stirred with sticks for about 10 minutes, when they become moist and sticky. The contents are then removed from the pans and rolled for two or three minutes on a table until it gets slightly twisted. The leaves are then spread in the sun, and again subjected to a rolling process, which gives them a further twist; they are then placed in the pans as before and stirred with sticks until they become very hot, when they are stuffed tightly in bags, where they remain for 10 or 12 hours. They are then finished in the pans heated to 160 degrees, dropping to 120 degrees at the finish. This last panning requires from 8 to 9 hours' constant stirring, for upon

this depends the production of the green color. It is a laborious operation, and after all, depends simply upon the rapidity of the drying process, and the absence of fermentation.

The grade of tea called Flowery Pekoe in black teas is called Young Hyson in green, and that corresponding to Orange Pekoe in black is Gunpowder in green; Pekoe in black is Hyson in green. Souchong in black is Imperial in green, and Congou in black is Twankay in green.

There are numerous fanciful names given to teas, but the above is said to comprise all that are worthy of being distinguished; all others are merely commercial distinctions.

The finest of all Chinese teas are those called Mandarin teas, which being but slightly fired and rather damp when in the fittest state for use, will bear neither transportation nor keeping. They are solely used in China.

The flavoring of tea is also a well-known process, and is only applied to middling and inferior qualities of the article. Various odoriferous flowers are employed for this purpose. Orange-flowers and the blossoms of jasmines are the favorites, although several other kinds are also used, such as the flowers of *Gardenia florida*, *Olea fragrans*, *Magnolia fuscata*, *Chloranthus inconspicuus*, *Illicium anisatum*, and various kinds of roses. The process of scenting teas is described as follows:

The tea is first perfectly manipulated, dried, and ready for market; 40 pounds of fresh orange-blossoms are mixed with 100 pounds of the dried tea; after 24 hours the orange-flowers are removed by sifting. The tea is now strongly impregnated with the odor of the flower, but it has also absorbed moisture from the fresh flowers, which is now removed by drying. The scent increases after the tea is packed in cases. The length of time which teas thus scented retain their odor varies with the different flowers used; some lose it in one year, others retain it for a longer period.

Tea is adulterated in many ways; the green color is often imparted by heating and manipulating it with Prussian blue, gypsum, and indigo. Tea-dust is mixed with clay and manipulated into the form of the ordinary leaf and sold as lie-tea. Tea-leaves which have been already used are again rolled into shape and sold as genuine tea. The leaves of other plants are added to those of the tea-plant, and thus the quality is impaired, or an undue proportion of stalk is added to the leaf, and the weight increased while its chemical value is lessened.

The following substances, it has been stated, have been found in tea: Iron, plumbago, chalk, China clay, sand, Prussian blue, indigo, turmeric, starch, gypsum, catechu, gum, and the leaves of the camellia, elm, chloranthus, willow, poplar, oak, elder, beech, hawthorn, and the wild plum.

The active principles of tea are an alkaloid called *theine* and a volatile oil to which the flavor and odor are due, and which possesses narcotic and intoxicating properties. It also contains 15 per cent. of gluten and a still larger percentage of tannin. A recent authority states that the

effects of tea upon the human system is to increase the assimilation of food, both of the flesh and heat-forming kinds, and that, with abundance of food, it promotes nutrition, while in the absence of sufficient food it increases the waste of the body.

It is generally understood that much of the manipulation given to tea in Asiatic countries is directed toward fitting it for ocean voyages. For this transportation the leaves must be roasted before shipment, and thus the aroma developed by firing is largely dissipated before the tea is used. It is an old saying that the best teas are only to be had in their highest excellence in tea-growing countries, where they can be procured before they have been submitted to all the severity of the heroic processes which they have to undergo before being packed for long voyages in the holds of vessels. It may therefore, be found that, for home consumption only, a less elaborate method of preparation may suffice, and that, as already mentioned, the article may enter into domestic commerce in cakes of dried leaves pressed into solid shapes, as is done with many other herbs, and the roasting, which develops the aroma, take place immediately before use, as is now done with coffee. Probably it will ultimately be ground like coffee, to secure the most delicate beverage.

It will probably be many years before tea-culture will engage the general attention of farmers and planters of this country. There are many reasons why this may be expected. The profits of the culture are not established; the management of the plant and the proper application of the processes must be for many years of a purely experimental character, and even where seemingly fair tests have been made, failures will occur, and although these failures may be traced to causes which persistent effort would overcome, yet where there is outlay and loss, accompanied with some doubt as to ultimate success, the effort will in most cases be abandoned.

Any attempt to estimate the profits of tea-culture in this country would simply be futile; this can only be reached after we see the results of actual and fairly conducted experiments. A writer from Florida remarks that "we should grow our own tea, but we do not, and will not, unless something is done to promote an interest in the matter."

It has been suggested that the United States Government could, at a comparatively small cost, materially assist in determining as to the feasibility of tea-culture, and the solution of the question of profit. What has already been accomplished by modern tea-manufacturers in the way of improvements upon the older Asiatic methods only suggests that still further innovations may be possible.

Seeing that much of the care bestowed upon the manufacture of tea is merely for the purpose of meeting commercial exactions in regard to the appearance of the article, it may be, that, by ignoring mere appearance, an equally good beverage may be produced by an entirely different system of preparation of the leaf. Of this I have strong hopes.

We procure the essential virtues of other herbs without subjecting them to such complicated processes, which, after all, are mainly to prevent the leaf from molding and decomposition, and there seems to be no valid reason why tea should differ from other herbs in this respect.

These questions could be answered in a few years if the government were to secure, say 20 acres of land in a suitable locality, and plant a portion of it yearly with tea-plants until 10 or 12 acres were planted. Then, when the plants become sufficiently matured, provide a small laboratory, fitted with the necessary apparatus, and place it in charge of a competent person who would make such experiments in the preparation of the leaf as might be suggested. This service need not cost more than \$20,000 or \$25,000; but it would require at least six years for its completion.

Doubts have been expressed as to the suitability of our soils and climates to produce as good an article of tea as is produced in Asia. Practical cultivators are aware that soils and climates exert certain influences upon vegetation; but these influences are potent everywhere. Natural causes are not spasmodic in their operations. In a special report of the Department of Agriculture, issued in 1877, we find extracts from letters submitted by cultivators of the tea-plant in the United States, some of which are here inserted.

Mr. THOMAS M. COX, Greenville, S. C., says:

Dr. Junius Smith was probably the first person who introduced the tea-plant into South Carolina. He was, I think, a native of Massachusetts, and had a daughter married to a gentleman connected with the English naval service, and resided with her in the East Indies. From them he received the seed, and probably some of the plants. He was very successful, but is now deceased, and his plants, without protection, were lost. I obtained, in 1857 or 1858, from the Patent Office, a box of tea-plants. I gave the most of them away, and retained a few myself. They have grown well without any protection, in the open air, and have attained a height of 8 or 10 feet. They have frequently matured the seed, and there are a number of the seed on the ground at this time. They are an evergreen in this climate, and are now in flower, with the seed of last year's growth fully matured upon the bush. I have never succeeded in making tea from the leaves, not knowing the process of manipulating them.

Mr. J. J. LUCAS, Society Hill, S. C., says:

The tea-plant has been grown successfully in this State, Georgia, and Louisiana. Dr. Junius Smith, late of Greenville, S. C., planted it more extensively than any one else in this State, but concluded that labor was too costly to make the culture profitable. Dr. Thomas Smith, of this place, and General Gillespie, of Cheraw, obtained a few plants about the same time that Dr. Junius Smith did, but did not attempt to make tea. General Gillespie's plants are still living and thriving. On the Middleton place, Ashley River, near Charleston, tea-plants are now growing, for ornamental use only, and are 10 feet high. A gentleman in Georgia (says the Rural Carolinian) obtained 441 pounds of tea from one acre of land, which, at 50 cents a pound, would bring \$220.50. Our average cotton-yield is about \$15 per acre; our best about \$40.

It is recommended to plant 5 by 5 feet, or 1,764 plants to the acre. Mrs. R. J. Screven, of Liberty County, Georgia, says the tea-plant thrives as high up as Athens, and is more liable to injury from heat than cold. The editor of the Soil of the South,

New Orleans, succeeded so well that he was offered \$1.50 per pound for his make of tea. Cotton is now, in price, below the cost of production, and we must try something else.

Dr. TURNER WILSON, Windsor, N. C., says:

I send you a package of green tea-leaves, blossoms, and a few seed in the capsules I have no person that understands curing the leaves, but will send a package of the dried leaves, as I term them. I frequently drink a simple infusion of the leaves dried in the shade (in the attic), and though not so good as the Chinese preparation, yet I know that I am drinking the *pure* tea, without any coloring-matter like plaster of Paris or prussiate of iron.

I have been raising the tea since 1858, but without much cultivation. My yard and garden are sandy soil, and the plants or bushes, without any cultivation, are of slow growth. I plant the seed about the 1st of April, but they come up under the bushes very thick from the fallen seed. Sometimes I throw a little dirt on the seed which I do not pick up. I have several hundred plants under the bushes, from 4 to 12 inches high, and about fifty in my front yard. I have never sold any seeds or plants, but could do so. I have distributed them from Maryland to Texas in small quantities. The leaves may be picked in May, July, and September. The last any time before frost. The cost of picking would be a mere trifle, as one hand could pick two or three bushels a day.

The curing of the leaves should be done in copper pans of different degrees of heat; but as none of my family, except myself, drink tea, I put up with the inferior curing in iron pots and ovens, or stove-pans. Dry in the shade, and pack tight in boxes or jars. The young tender leaves no doubt make the finest green teas; the old, full-grown, and refuse leaves, the black tea.

JAMES H. RION, Esq., Winnsboro, S. C., says:

I have no experience in the making of tea, but can certify to the adaptability of the soil and climate of my section to the growth of the plant itself. I live in Fairfield County, which is a little north of the center of the State. In the fall of 1859 I received from the Patent Office, Washington (of which the Agricultural Department is a part successor), a very tiny tea-plant, which I placed in my flower-garden as a curiosity. It has grown well, has always been free from any disease, has had full outdoor exposure, and attained its present height (5 feet 8 inches) in the year 1855. Since then it has been occasionally trimmed. The bush is like a ball resting on the ground, its breadth being equal to its height. It is continually producing perfect seeds, which readily germinate and produce healthy seedlings. The seeds are the size of small filberts. This shows that the plant finds itself entirely *at home* where it is growing. There cannot be the least doubt but that the tea-plant will flourish in South Carolina.

Mr. H. B. HOLLIDAY, Valdosta, Ga., says:

We have but two tea-plants, which have done well. They were brought to this place by Samuel Varnadoe, now deceased, from Liberty County, Georgia. William Jones and Mrs. Rosa Screven, of Liberty County, are now raising tea, and I have just been told that it does well. Their post-office is Dorchester, Liberty County, Ga., via No. 2 Atlantic and Gulf Railroad.

Mr. W. M. IVES, Jr., Lake City, Fla., says:

The seeds of the tea-plant were obtained from the Patent Office about the year 1858. The plants can be propagated either from seeds or slips. It is an evergreen shrub. I think five years from seed, or three years from slips, would be as early as a crop of leaves could be taken. After that the crop would increase annually.

Its cultivation might be made profitable, but our people do not pay enough attention to such objects as promise returns in future years. The method of drying the leaves is a very simple process. Many families already possess a number of tea-plants, but they grow them simply for their beauty and novelty. Tea can be grown in Georgia

as well as in Florida. We should grow our own tea, but we do not, and will not, unless something is done to promote an interest in the matter.

Mr. JAMES S. MURDOCK, Charleston, S. C., says:

I would also mention that the tea-plant is well suited to our climate. A gentleman at Georgetown, on our coast, writes me that he has raised a large number of plants from the seed, and they are as thrifty and grow as well as our wild orange, the cold weather, which we have occasionally, producing no effect on them.

Dr. A. W. THOENTON, Portland, Oreg., says:

Some years ago a capitalist, Mr. Samuel Brannan, started the cultivation of tea at Calistoga, in Napa County, California, but through some mismanagement at the outset the crop did not succeed. And as at that time capitalists could make their 3 per cent. a month in other enterprises, Mr. Brannan saw no money in it, and abandoned the enterprise. But to this day solitary plants can be seen in that locality, exhibiting vigorous growth, proving the suitability of both soil and climate. Since that time a gentleman (name forgotten) started a plantation of tea at Modesto, in the foot-hills of the Sierra Nevada Mountains, Stanislaus County, California, in which the plants have done so well that from the last accounts he was so far encouraged as to extend his plantation; but as yet I have not heard of it as coming into the market as a finished article of commerce.

With regard to Oregon and Washington Territory, I am not aware that the experiment has been tried yet, although there are localities in Southern Oregon, about Jackson County and the Rogue River country, and perhaps east of the Cascade Range, where the summers are warmer and the winters are colder and drier, in which the plant would flourish, though subject to a ground freeze in winter. In the Willamette Valley the *Wistaria sinensis* does well in the open air, but *Fuchsias* and *Salvia splendens* require to be taken into shelter in winter.

That the tea-plant is admirably suited to Northern California and Southern Oregon I have no question; more especially as the light on this coast is so abundantly charged with actinic rays, as shown by the richness of the foliage and gorgeous tints of the fruits and autumnal foliage, supports the view that any plant, the active principle of which is located in the leaves, would *prima facie* yield a richer product where actinic rays are abundant (which are known to have an important influence upon chlorophyll and leaf-development) than in less favored climes.

That the moisture of Northern Oregon and Washington Territory might give rankness to the leaf development inimical to the plant as a commercial product can only be proved by experiment, and, if so, might be sufficiently modified by a system of pinching back in summer and not pruning in winter or fall.

I have not been sufficiently long in Oregon to form an opinion of the winters from actual experiment; and the hearsay opinions of others are of very little value with respect to any special inquiry, the subject-matter of which they are unacquainted with, unless, indeed, they happen to be men of scientific education, capable of appreciating the value and influence of natural laws so far as at present developed.

Mr. ARTHUR P. FORD, Charleston, S. C., says:

About four or five years ago I obtained from a friend some seeds of the tea-plant, and planted them in my garden, twenty-one miles from Charleston, inland. The plants came up readily, were duly transplanted, and are now fine shrubs three feet high, and seven in number. The foliage is luxuriant; and the plants bear the coldest weather here without any ill effects; the mercury on more than one occasion marking 16°; and the plants being encased in ice at other times also.

Owing to my unavoidable absence during the past two summers, I have been unable to gather and prepare the leaves.

I am satisfied that both tea and coffee plants would succeed in the South, and it would be well if our planters could be induced to experiment with both.

WILLIAM SUMMER, Esq., Newberry County, South Carolina, says:

There are several healthy, vigorous tea-plants growing in Columbia; these plants have been cut back to keep them in proper condition in the grounds where planted. I have seen at the Greenville residence of the late Hon. J. R. Poinsett the tea-plants growing finely, of those introduced by Dr. Junius Smith. And he remarked to me that we have here the *Olea fragrans* (fragrant olive), with which we can flavor the tea equal to any prepared for the special use of the Emperor of China. The fragrant olive blooms freely from early spring until midwinter, and the flowers, when gathered fresh and put in the caddy among the tea, impart a delightful aroma to the tea. I have at different times imported a few tea-plants from Angers, France, and these have been disseminated from the Pomaria nurseries, and found to succeed. I have no doubt of the success of the tea-plant in the middle and upper portions of this State.

Col. S. D. MORGAN, Nashville, Tenn., says:

Of all the plants for the South Atlantic States, that of the Chinese or Japanese tea promises most success. Before the war I had a few of the shrubs growing in a small parterre attached to my town dwelling, from which I obtained leaves as rich in aroma and "*thems*" as is to be found in tea from any country whatever.

The shrub grows luxuriantly in Central Georgia—even 100 miles north of Augusta, to my personal knowledge—as I there used the domestic article for several weeks' time and found it excellent. There may, however, be a difficulty about its culture, for want of a very cheap class of laborers to pick and prepare the leaves. This, however, is a subject I have not investigated, but I think it is worthy of a thorough investigation.

Mrs. MARY J. IVES, Lake City, Fla., says:

Your letter making inquiries in regard to the tea-plant has been received.

My husband obtained the plants, through a friend, from the Department of Agriculture at Washington, in the year 1858. They were then small plants, only a few inches in height. Now they are large shrubs.

I have used the leaves for making tea, and those who have tasted it have pronounced it of a very fine flavor. Am sorry that I have none on hand at present, that I might send you a sample.

The plant is not at all affected by cold weather, such as we have in this climate, blooms and bears seeds, and can be propagated by cuttings as well as by the seed. By this mail I send you some seed.

Miss M. C. MCFALL, High Shoals, Anderson County, South Carolina, says:

I take pleasure in informing you that I have a tea-plant which I have had fifteen years, and which was sent me by Col. J. D. Ashmore while he was in Congress. It has remained in the center of the garden where it was originally planted, and has had no care or cultivation. Fifty plants, I suppose, could have been reset from the young seedlings sprung up beneath it from the fallen seeds, but I was afraid to disturb them. This year I have cured some of the leaves, and will send you a sample. I have had no time to show me how to prepare them. I have given away five pounds of the tea, and have been using it in the family all the year. The plant is an evergreen, and stands the winters perfectly well. It is 8 feet in height, 4 feet in diameter, and never has been pruned or trimmed.

Mr. ALEX. M. FORSTER, Georgetown, S. C., says:

In reply to your letter received through Mr. Murdock, I will give you what little experience I have had with the tea-plant in this low country of South Carolina.

The original plant I brought from Columbia, S. C. It is a genuine *Thea viridis*, from seed, I think, produced from the tea-plants brought to this State some years since by

Dr. Junius Smith, and cultivated near Greenville. After my plant had attained the height of two or three feet, it began to bear flowers and seed. From these seeds, or nuts, I have now 50 or 60 plants of various sizes; some of them bearing fruit also. I might have had 500 plants as well as 50, so easily are they propagated and so abundantly do they bear seed. The only care necessary is to preserve the tap-root as carefully as may be in removing the young plants from the nursery-bed. My plants are in a rich, dry soil, and grow very rapidly, requiring only three or four years to reach the height of 4 feet. They are as thrifty and bear the vicissitudes of our climate as well as the native cassina (*Ilex cassine*). I have several times picked (in April) a quantity of the young leaves, and commenced the process of curing them according to the directions given by Mr. Fortune (see Agricultural Reports, 1853), but I have never had the perseverance to carry out fully the entire process, as it occupies hours to complete it, and requires the patience of a Chinaman; yet I have made some fair black tea, better than much that is said to have come from China and for which I have paid \$1.25 per pound.

The Chinese method of curing tea is impossible in this country, where we cannot obtain labor at 5 to 10 cents per day; yet some equivalent to this process is necessary to the production of tea, such as we drink it, for a decoction of the tea-leaves dried without this manipulation has little resemblance to the beverage we all so much appreciate. I am convinced that the slow rolling and pressing at certain intervals, and then the heating and rolling over and over before the final drying, are required to break the sap-vessels in the leaves, in order to produce in the juices, by contact with the air, a certain degree of fermentation necessary to bring out the flavor or develop the properties we find in the Chinese preparation. If there could be invented some machine to imitate this hand labor, to effect the same slow process by means less expensive than the human hand, I think that the cultivation of tea might become not only practicable, but profitable to a large portion of our Southern country.

Rev. W. A. MERIWETHER, Columbia, S. C., says:

I obtained a Chinese tea-plant from North Carolina nine years ago, and set it out in open ground in a plat of Bermuda grass. It has received no cultivation, and is now a fine shrub, measuring to-day six and a half feet in height by nine feet across the branches at the base. The soil where it grows is light, sandy land, with no clay within two feet of the surface.

The plant is not affected by the severest cold to which our climate is subject. It was not the least injured by the intense cold of December, 1870, when my thermometer registered 1° above zero; the coldest weather I have ever known in this latitude.

My plant blooms from the latter part of August on to December, and makes a beautiful ornamental shrub. It is evergreen. I have obtained tea of the best quality from the cured leaves. The process of preparing the leaves for use is the same as that given in the Southern Cultivator, January number, 1872. There have been successful experiments made with this plant in Florida and in Georgia. That the climate of the Southern States is well suited to the cultivation of the tea-plant I think there can be no question. I sincerely hope you may succeed in your efforts to arouse our people to the importance of its cultivation. If only enough tea were made to supply the home demand, what an immense annual saving would result!

Hon. JAMES EDWARD CALHOUN, Trotter's Shoals, Savannah River, S. C., says:

At my last visit to Rio de Janeiro, a treatise on tea-culture, written in Portuguese, was presented me by the author, the priest-superintendent of the imperial botanic garden.

On my return I was traveling in company with the governor toward Greenville district, when the death of Junius Smith was rumored. I urged the governor to deflect from his route to inspect the tea-plants, and, if it might be, in his official capacity to

assume the carrying out the experiment instituted by Mr. Smith, promising, in such case, to make a translation of the treatise and send it to him. No steps, however, were taken in that direction. In acknowledging your communication, I renewed the promise to make the translation for your department. A prolonged, unsuccessful search among my papers for the treatise has been one cause of the delay of my answer.

Few words will suffice to detail my experience. Eighteen years ago some half-dozen tea-plants, brought from China, were sent me. I set them in what had been a strawberry-bed, in a soil friable, of medium quality, unmanured. The war and its consequences supervening, I have contented myself with merely securing a supply of tea for my household. Nothing has been done beyond keeping down the weeds with the hoe. The plants have had no protection; but during a portion of the first summer, seedlings have some shelter. As yet there has been no damage from blight or from insects. Frequently leaves are clipped in moderation from all parts of the bush, care being taken not to denude. They are parched in an iron vessel at the kitchen fire, constantly stirred, and immediately afterward packed in air-tight boxes. To prepare them for infusion, they are ground in a coffee-mill. I inclose leaves plucked to-day, measuring from $3\frac{1}{4}$ to 5 inches, and as you will perceive exhibiting three varieties.

The capsules of the tea-nuts afford the most pleasant of bitters. They were saved and given to the matron, an item in her *materia medica* for my people, long before I heard that a physician in Georgia had carefully tested the "tea-hull," and found it to possess all the properties of the cinchona.

The plants have buds, blooms, and fruit. As the latter drop, a portion are planted. The remainder are kept in brown sugar, and reserved for planting in mid-winter. They are ornamental and marvelously fecund.

At the axil of every leaf there is a bud; often two, sometimes three buds. They would be invaluable to the apiarian.

On the 12th of November frost stopped the blooming of cotton, but swarms of the honey-bee continued to visit the fresh blossoms of the tea-plants. Bumble-bees and yellow-jackets also present themselves. The latter, feeding differently from the others, fall to the ground gorged.

This is the perfect climate for the tea-plant.

Mr. S. I. JONES, Thomasville, Ga., says :

Your favor relative to the tea, its cultivation and preparation, has been received. Inclosed please find an article written by my sister, Mrs. Screven, of Liberty County, Georgia, who has had some experience in tea-making, and has plants for sale. I have several hundred plants on my farm near this place, and from which I make a good article for home use. I soon hope to have five acres set out. I prepare the tea similarly to Mrs. Screven.

Mrs. R. J. SCREVEN, McIntosh, Liberty County, Ga., says :

In response to your request for an account of the tea-plant, and also of the process of preparing the leaves, I herewith give you my experience. Mr. Robert Fortune, in his "Two Visits to China," says: "The soil in which the tea-plant does best is moderately rich; that is, it contains a considerable amount of vegetable matter, mixed with clay, sand, and particles of rock." My experience is that it does best in land somewhat low, but not such as water will lie upon or is overflowed. I sow the seed in the fall, as soon as they ripen and drop from the bushes, in drills eighteen inches apart. They come up readily in the spring, and by winter are from three to six inches high. Under the shade of some large tree is usually the place selected for sowing the seed, for if the plants are exposed to the hot sun while young, they invariably die the first summer. When six months old they are ready for transplanting; have generally a good supply of roots, and can be set out any time from the first of November to the last of March. In putting them out, I have generally prepared holes to receive them, to give a good start, so that fine, healthy bushes will be obtained.

The holes are usually dug out a foot or more deep, and equally as wide, and filled in with half-rotted leaves, a little cow-pen manure and surface soil; all of this to be packed down to prevent water settling around the plants whenever it rains. The tea is planted up to its first leaves, and a little water given to press the earth close to the roots. As soon as the warm spring weather begins, each plant is shaded from the sun. A crutch, two feet out of the ground, is driven in on each side of the plant, a strong stick placed across the crutches, and pine branches leaning upon this make a cheap and good shade.

The tea, when young and not large enough to shade its own roots, is very sensitive to the heat of the sun. This shading being somewhat troublesome, I have adopted another plan. It is this: to set out the plants under the shade of some large bush or tree until they are about two feet high, then take them up carefully, cut off nearly all the tops, and plant out in their permanent places. As soon as spring opens they will put out sufficient leaves to shade their own roots. In April, 1867, I think it was, Mr. Howard, from Baltimore, who has been engaged on a plantation for several years in the East, visited my father's plantation in this county. He expressed himself as surprised at the splendid growth of the tea. Being there at the time of gathering the young leaves, he plucked from one bush alone, prepared the tea himself, and took it on to Baltimore, where he had it tested and weighed. He wrote back that it had been pronounced stronger and of superior flavor to the imported, and that by calculation he was satisfied that four hundred and fifty pounds of cured tea could be made here at the South to one acre of ground.

Mr. Fortune, in writing of the tea-growing districts of China, states that at Hong-Hong, in summer, the maximum heat is 94° Fahrenheit, and the minimum 80°, while in winter the thermometer sometimes sinks as low as the freezing-point. At Shanghai the extremes of heat and cold are much greater. Here the thermometer sometimes indicates a temperature of 100° for several days successively in summer, and in winter frequently falls to twelve or twenty degrees below the freezing-point.

MODE OF PREPARING.

I have only prepared black tea, the process being very easy and simple.

The leaves are gathered the day before they are to be dried, and spread thinly over tables to wilt. The small leaves are cured by themselves, as they make the most superior quality of tea. The day after being plucked, they are taken in the hands and rubbed until they become soft and flaccid. They are then placed in heaps and allowed to remain so for about one hour. They are then put into a Dutch oven, which is heated by a few coals under it. While in the oven they are constantly stirred with the hand to prevent scorching. They are roasted five minutes, taken out, and rolled again upon the table. After being rolled, they are exposed in the open air in the sun, and frequently stirred. While these are out in the air, another set is in the oven. When all have been roasted, those first put out in the air are brought in, and roasted again for five minutes, then taken out and rolled again. They are now placed in a sieve about an inch thick, and held over a few hot coals, stirring all the time. They are then taken out and rolled again. This process of rolling and toasting is continued until the tea assumes a dark color.

After all the leaves have been treated thus, they are put in a basket and hung over a few coals, and frequently stirred until the tea appears black and dry. Mr. Fortune, during his visit to China, "verified the opinion previously formed that black and green teas could be produced from the same plant, and that the dissimilarity of appearance, so far as color is concerned, depended only upon manipulation," green tea being produced by coloring black tea with a powder of three parts Prussian blue and four parts gypsum, applied to the tea during the last process of roasting. I have several times received letters asking if I had the plant for sale from which the green tea was made, and as my authority was not sufficient to convince them that the same

plant produces both black and green, I have quoted Mr. Fortune, whose botanical knowledge and learning cannot for one moment be doubted.

Mr. J. W. PEARCE, Fayetteville, N. C., says :

Your favor of October 27, in regard to the Chinese tea-plant, was received a few days ago. The original seeds were sent to me, about the year 1860 or 1861, by Hon. Warren Winslow, then member of Congress from this district. I gave the greater part of them to Mr. James M. Smith, a successful horticulturist of this vicinity, and kept the rest myself. We planted them in light sandy land, and they have grown and flourished ever since without any particular attention.

My plants are now about five feet high, and very thick and bushy near the ground, covering a space as large as a molasses hogshead; have no protection from any kind of weather. The mercury has been as low as 10° below zero. They do not seem to suffer from drought, are ever green, and bear a beautiful white flower, with little scent until nearly ready to fall. The bees are very fond of the flowers. The seed are like the hazel-nut; have a hard shell and a bitter kernel, and take a long time to germinate. Hence it is better to plant them on the north side of a fence or house, where they will remain moist. They come up readily when left under the bushes where they have dropped. The plants can then be set out successfully, care being taken to avoid breaking the long tap-root peculiar to them. My plants have never suffered from insects of any kind. Half a dozen plants furnish my family, of five or six persons, with more tea than we can use. We prepare it by heating the leaves in an oven until wilted, then squeeze them by hand until a juice is expressed from them, then dry them again in the oven. The tea is then quite fragrant and ready for use. It improves by age. We pick the leaves about three times during the year. The younger the leaves the better the tea. I think it will grow in any ordinary soil, clay or sand. The seed should be planted about the month of January.

I could select much more evidence as to the quality of tea produced by ordinary domestic processes, but it is sufficiently well ascertained that it is within the capacity of hundreds of thousands of people in this country to grow and prepare all the tea they require, leaving the question of its profitable commercial culture to be settled by practical test.

WASHINGTON, D. C.



DEPARTMENT OF AGRICULTURE.
SPECIAL REPORT—No. 19.

REPORT

UPON THE

CONDITION OF CROPS

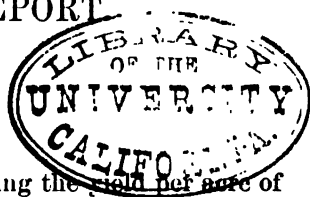
NOVEMBER 1, 1879.



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1879.

NOVEMBER CROP REPORT

WHEAT.



The returns received by this department, giving the yield per acre of wheat, confirm the result foreshadowed in previous reports. The crop produced this year is the largest ever made, and will exceed that of 1878 some 26,000,000 bushels. The actual yield per acre for the whole country is 13.9 against 13.1 last year. As there is still another inquiry regarding the total product, it would be premature to estimate the actual out-turn till after that investigation is closed.

On the Atlantic slope, north of Delaware Bay, the yield was slightly less than last year; New York and New Jersey each report a decline, caused by drought and unfavorable weather in the spring; Pennsylvania held its own in quantity and improved in quality. All the South Atlantic and Gulf States show an increased yield except Texas, where the drought caused a very heavy decline from the crop of last year. The Southern inland States show a decided increase in yield, particularly Tennessee and Kentucky. In those States, north of the Ohio River and east of the Mississippi, the season has been most propitious and the yield has been very large, probably the largest ever made. In the State of Indiana the increase was from 16.3 bushels per acre last year to 20.3 this year. Ohio and Michigan each somewhat exceed 19 bushels per acre, and Illinois with her immense acreage made within a slight fraction of 19 bushels. It is in these States that the great bulk of the increase of this year over last was made.

In the States west of the Mississippi, and in those States where spring wheat is the staple variety sown, the yield is not much changed from last year, but the quality is much improved. The same climatic influence that was so detrimental last year, viz, drought and extreme heat, was felt this year, but to a less extent. The increase in acreage in these States will swell the total product to considerably larger volume than that of last year.

Kansas reports quite a decrease in yield per acre, and, as the increase in acreage was slight in that State this year, the total product will be less.

On the Pacific there is a decided decline, and the crop of California does not promise to be more than three-quarters of that of 1878. Oregon also reports a decrease for this year in yield per acre.

The following extracts from correspondence are given:

MAINE.—*Oxford*: Below an average condition. *Somerset*: Generally good.

NEW HAMPSHIRE.—*Carroll*: Crop rather small, and affected by rust and weevil-fly.

NEW YORK.—*Genesee*: The yield is not quite as large as in 1877 and 1878, but the quality is superior. *St. Lawrence*: In many instances almost a failure, not returning the seed. Injured by cold, dry spring, and the wire-worm.

NEW JERSEY.—*Morris*: Yield and quality good. *Salem*: Yield, in some sections, greatly reduced by severe hail-storm in June, some fields in good wheat-growing districts not averaging 3 bushels per acre. *Camden*: Many farmers raise 30 bushels to the acre where sown early. *Warren*: Yield small, but quality good.

PENNSYLVANIA.—*Lebanon*: The quality much better than last year. This fall nearly all sowed between the 15th and 25th September, experience having shown our farmers that this is the best time in order to contend with the fly. *Lehigh*: Better in quality than quantity. *Monroe*: The best crop, in many respects, ever known; average weight, 67 pounds per bushel. *Montour*: Harvested in good condition, and yield heavy for amount of straw. *Fayette*: The quality of the wheat produced in this county cannot be excelled; 5 per cent. better than last year. I believe it to be even above that. The yield quite as good as last year, which was one of the largest ever harvested in this county. *Indiana*: The yield is lower than usual for this county. *McKean*: Thrashing not yet finished. *Franklin*: On good land the yield was from 20 to 30 bushels per acre, but much less on poor land.

MARYLAND.—*Cecil*: Unusually good. *Montgomery*: A good crop, saved by timely rains. *Caroline*: Never had a finer crop of Fultz. *Harford*: An unusually large area sown this fall. The Fultz variety is very much in favor. *Howard*: Injured by wet weather while in shock. *Prince George's*: A slight improvement on last year's crop; the average will not exceed $6\frac{1}{2}$ bushels per acre.

VIRGINIA.—*Loudoun*: Farmers greatly disappointed in yield per acre; some made 15 to 30 bushels, but the majority fell far below that. *Brunswick*: The quality is very good. *Orange*: A distressingly poor yield, although the quality is very fine. *Amelia*: The yield is below an average, but the quality about 110. *Dinwiddie*: While the yield was small, owing to winter-killing, the quality was very fine. *James City*: High average, due to favorable season and extensive use of commercial fertilizers. *Montgomery*: Yield small, but quality exceptionally good. *Northampton*: Yield good, quality excellent, but acreage small. *Campbell*: Did not yield as well as was expected; average about 4 bushels per acre. *Craig*: Quality very fine. *Rockbridge*: The small yield is due to the severity of late winter and drought of the summer. *Hanover*: The yield rather poor, but the quality is superior. *Middlesex*: The average yield per acre is far below what was expected at harvest. *Highland*: Below average in quantity, but above in quality.

NORTH CAROLINA.—*Davidson*: Winter-killed. *Forsyth*: Grain very good. *Nash*: The yield small, owing to rust. *Yadkin*: Yield short, but the quality about the same as last year. *Haywood*: Yield above an average and quality never excelled. But little raised that will not weigh over 60 pounds per bushel, and some 65. *Lenoir*: About 50 per cent. better than last year. *Guilford*: Thirty quarts of fine grain, weighing 46 pounds, raised from one quart of the yellow Missouri variety, received from the department last fall. *Transylvania*: Stood short and thin on the ground, but grain good. *Polk*: Below average.

SOUTH CAROLINA.—*Orangeburgh*: A better crop than usual. *Clarendon*: Scarcely worth harvesting, owing to rust and decrease in area.

GEORGIA.—*Murray*: A good crop. *Towns*: Better quality and a larger area sown than usual. *Walker*: The 8 quarts of Missouri received from the department yielded 3 bushels of fine quality grain on upland. *Walton*: Best crop for years. *Carroll*: Increased area sown in small grain this fall and will be next spring. *Clayton*: The average for the yield is about 80, ranging from 5 to 50 bushels per acre. *Jackson*: Medium crop.

MISSISSIPPI.—*Lafayette*: Under our system of shallow plowing this crop makes but small yields. *Tale*: But few farmers pay any attention to the production of this crop, only in cases where the land is too much worn out for cotton. *Choctaw*: A fair crop.

LOUISIANA.—*Richland*: The frequent overflows which occur here have discouraged the raising of this crop.

TEXAS.—*Dallas*: Quality good, but yield 50 per cent. below an average. *Wood*: Yield short, but grain very fine and well saved. *Burleson*: Small yield, but quality good.

ARKANSAS.—*Marion*: Below an average, owing to drought. *Clark*: Not as good as was expected.

TENNESSEE.—*Jefferson*: A very light yield, having frozen out. *Montgomery*: I averaged 14½ bushels per acre on all my land. *Dyer*: Large crop of superior quality grain. *Grainger*: Small yield and thin stand, caused by winter-killing; but the quality is superior. *Lawrence*: The quality is excellent, but owing to unfavorable weather the yield is less than in 1878. *Rutherford*: Acreage, 20 per cent. less than in 1878; yield, 7½ bushels per acre, being but two-fifths below the average of the past two years; quality of grain better than for many years. *Loudon*: Fall sowing retarded by drought. *Orerton*: Although of exceedingly fine quality the yield was small, having been frozen out last winter.

WEST VIRGINIA.—*Berkeley*: Full average yield and above average quality, some fields of the Fultz variety yielding over 30 bushels per acre. *Brooke*: Fultz best variety ever sown here. *Braxton*: Yield not so large as other years; quality above average. *Calhoun*: Good crop. *Hardy*: Better quality of grain than ever grown before. *Jackson*: Yield beyond all expectation. *Mercer*: Three-fourths of our lands are in primeval forests. *Wetzel*: Threshed out remarkably well; quality unsurpassed; Fultz leading all other varieties. *Webster*: Very good crop. *Nicholas*: Good quality, but poor yield; severe winter and drought.

KENTUCKY.—*Barren*: Crop cut short by drought; acreage increases each year. *Garrard*: Quality would have been as good as last year's crop if it had not sprouted in stack. *Johnson*: Best yield for years. *Jessamine*: Threshed in fine condition. *Graves*: Yield not so large as usual; quality never better. *Lyon*: Smutted. *McLean*: Increased acreage, but average yield below that of 1878. *Nelson*: Saved in good condition. *Shelby*: Plump grain, but damaged by smut. *Todd*: Quality at least 25 per cent. better than last year. *Union*: Best crop for many years. *Martin*: Better crop than anticipated in early part of the season.

OHIO.—*Allen*: Best crop ever raised; favorite varieties, Scott, Fultz, and Clawson. *Lorain*: Quality never better. *Miami*: Best and largest crop ever grown in county. *Jefferson*: Above average yield. *Scioto*: Some fields yielded over 40 bushels per acre. *Warren*: Fultz 5 bushels per acre ahead of other varieties; Clawson stands next. *Washington*: Fultz almost exclusively grown; some valley lands yielding 50 bushels per acre. *Wood*: Yield exceeded most sanguine expectations.

MICHIGAN.—*Antrim*: Good crop; plump berry. *Clinton*: Yielding better than last year. *Huron*: Extra good crop. *Lapeer*: White Russian is the favorite variety. *Saint Clair*: Spring wheat very poor. *Wayne*: Quality much above average. *Nearago*: Light yield, but quality good; Clawson leads. *Shtawasssee*: Winter wheat below average yield; quality good. *Kent*: Unusually large yield; quality excellent. *Emmett*: Harvested in good condition; yield very satisfactory.

INDIANA.—*Clay*: A small portion of crop damaged in the stack by August rains. *Carroll*: Best crop ever produced in county. *Decatur*: Best crop ever raised in county, both in quantity and quality. *Hancock*: Best we ever had. *Morgan*: Indiana certainly has the boss wheat crop this year. *Warren*: Yield and quality better than any previous year. *Franklin*: Best crop in fifty years. *Ripley*: Quality excellent. *Noble*: Acreage greater than any previous year. *Wabash*: Most uniform yield ever produced in county, and entire freedom of chaff. *Warrick*: Most fields too short to be cut. *Steuben*: Above average yield. *Pike*: One-tenth of crop damaged by rain in stack. *Bartholomew*: Best ever grown in the county. *Greene*: Best yield we ever had in this county; Fultz leads.

ILLINOIS.—*Boone*: Spring wheat, small yield and poor quality; drought and chinch

bugs; winter wheat, large yield and good quality. *Brown*: Fine crop, both in quantity and quality. *De Kalb*: Limited acreage winter wheat sown and a large yield. *Fayette*: Best crop ever raised in county. *Greene*: Very fine. *Carroll*: Best quality; 5 bushels per acre short from last year's yield. *Madison*: Best crop ever raised in county. *Saline*: Best season we ever had for all kinds of crops. *Hancock*: Best ever raised, both in quantity and quality; some fields 42 bushels per acre. *Jackson*: Heavier yield than expected; quality never better. *Kendall*: Winter wheat, superior quality; spring wheat, blighted. *McLean*: Heaviest yield in thirty-eight years. *Richland*: Short crop; drought. *Shelby*: Largest crop ever raised. *Winnebago*: Winter wheat extra good; spring wheat very poor; 4 acres of spring to 1 of winter. *Henry*: Spring wheat very poor; what little winter wheat was sown is excellent. *Jersey*: Finest crop for years; quality much better than usual. *Putnam*: Increased acreage of winter wheat and unusually large yield; Odessa mostly sown. *Saint Clair*: Large acreage and splendid yield. *McDonough*: Light crop; chinch bugs. *Bureau*: Winter wheat an extra crop; some fields yielded 40 bushels per acre; about four-fifths of acreage was spring wheat. *Mason*: Fall wheat has never been better; spring wheat very poor and lessens the average yield.

WISCONSIN.—*Crawford*: Winter wheat principal crop; fair average yield; Fultz ahead. *Dunn*: Good quality; Odessa now sown for winter wheat and does well. *Douglas*: Winter wheat badly rusted and shrunken. *Grant*: Yield of spring wheat less than 1878, but quality better; largest yield of winter wheat was 49 bushels per acre. *Juneau*: Much above average. *Rock*: Spring wheat poor quality and below average yield; winter wheat splendid quality and large yield. *Racine*: Quality better than expected. *Walworth*: Fair quality. *Milwaukee*: Winter wheat all plump, No. 1 grain; some fields yielded over 40 bushels per acre.

MINNESOTA.—*Le Sueur*: Poor yield, but quality good. *Lac-qui-parle*: Number one. *McLeod*: Weight 56 to 60 pounds per bushel. *Meeker*: Yield less than anticipated; quality superior. *Todd*: Number one. *Fillmore*: Excellent quality. *Redwood*: Better than last year as to quality, but lighter yield. *Ramsey*: About two-thirds of an average crop; spring wheat good, plump berry. *Martin*: Twenty-five per cent. injury by hot weather in July. *Houston*: Good quality, but lighter yield than last year. *Rock*: Spring wheat nearly a failure; many farmers did not realize enough for seed; quality No. 2. *Stearns*: Most of crop grades No. 1.

IOWA.—*Calhoun*: Extra good. *Hardin*: Not yielding so well as expected. *Johnson*: Winter wheat excellent. *Lyon*: Destroyed by grasshoppers. *Mitchell*: Light yield but excellent quality. *Howard*: Yield less than expected; foul and shrunken. *Taylor*: Excellent fall wheat; poor quality spring wheat. *Monona*: Injured by drought and grasshoppers. *Cherokee*: Good quality; some varieties full weight. *Fremont*: Good crop. *Plymouth*: Nine-tenths of what was sown was not worth cutting. *Clarke*: Injured by drought and chinch bugs.

MISSOURI.—*Benton*: Very good. *Bates*: Better than expected. *Callaway*: Crop doubled in the past five years; Fultz leads. *Carter*: Quality good; yield light. *Gascoade*: Very fine. *Howard*: Short crop; drought. *Macon*: Fine crop and good quality. *Marion*: Above average. *Maries*: Extra good. *Perry*: Farmers are, for once, satisfied with yield, quality, and price. *La Fayette*: Some damage by rain before stacking. *Saint Charles*: Excellent on bottom lands. *Laclede*: Half crop; increase in acreage will make up a portion of deficiency.

KANSAS.—*Ellis*: Seriously injured by drought. *Lane*: None raised this year. *Reno*: Many farmers did not realize the seed sown. *Ottawa*: Light yield, drought, and chinch bugs. *Graham*: Crop not so good as 1878: silver chaff, from the department, is a great success. *Marion*: Many fields not cut. *Saline*: Light crop. *Stafford*: Very small yield. *Montgomery*: Good crop in north half of county. *Washington*: Fall wheat done well where it was drilled in.

NEBRASKA.—*Dawson*: Yield about one-third of last year's crop. *Fillmore*: Light yield and poor quality; drought and chinch bugs. *Johnson*: Spring wheat badly in-

jured by chinch bugs. *Sarpy*: Not up to our expectations. *Seward*: Lighter yield than expected; chinch bugs. *Antelope*: Best crop ever raised in the county. *Nuckolls*: Some fields destroyed by storms, others by chinch bugs. *Harlan*: Yield falls 25 per cent. below farmers' estimates.

CALIFORNIA.—*Calaveras*: Above average. All crops good and prices fair. *Humboldt*: Harvested in good condition. *San Joaquin*: Better yield than expected, although badly blighted; some fields yielded 50 bushels per acre fine plump grain. *Solano*: Thirty per cent. below average quality; rust. *San Bernardino*: Rusted in 1878; drought in 1879. *Tulare*: In some localities it was so dry that the grain did not sprout. *Yuba*: Wet spring prevented it filling well.

OREGON.—*Benton*: Winter wheat is good; late sown spring injured by rust and badly shriveled. *Grant*: Best for years. *Josephine*: Before ripening above average, but late rains and heat caused late sown to rust. *Lane*: Many fields badly rusted. *Clackamas*: Quality not so good as usual; injured by fire blight or rust. *Marion*: Fall wheat better than last year; spring wheat rusted, some fields not worth cutting. *Washington*: Excessive hot weather in July caused it to rust badly, reducing it to a very light crop.

COLORADO.—*Larimer*: Better yield than any former year; some fields produced 70 bushels per acre; no smut, rust, or fly. *Pueblo*: Drought reduced all crops of the county to below average; in some localities they are entire failures.

DAKOTA.—*Cass*: "It is doubtful if there is a county in the United States that will harvest more wheat than this." *Lake*: Good crop. *Moody*: Mostly No. 1. *Trall*: Injured by hot weather; straw heavy but heads poorly filled. *Turner*: Too dry for all growing crops.

INDIAN TERRITORY.—*Cherokee*: All crops seriously injured by drought. *Seminole*: Driest season since 1860; most everything ruined by continued drought.

NEW MEXICO.—*Colfax*: All crops cut short by drought. *Dona Ana*: Rio Grande River dried up for about 600 miles; most all crops a failure. *Lincoln*: Drought has about ruined all crops. *Mora*: Very dry. *Taos*: Yield unusually small; quality, poor; drought.

UTAH.—*Beaver*: Driest year known since settlement of Territory. *Box Elder*: Irrigated farms yielded an abundant crop of excellent quality; dry farms yielded but a very poor crop. *Cache*: Good crops where water was plenty for irrigation; some damage by grasshoppers in early part of season. *Davis*: Dry fields, poor yield, and inferior quality; no rain since June 12. *Morgan*: Grasshoppers destroyed one-half of the grain crop and injured the other half. Driest and hottest summer since the valley has been settled. *Rich*: Condition of all crops lowered by drought. *Salt Lake*: Driest season ever known. *Utah*: No rain since April 15; everything dried up. *Wasatch*: Grasshoppers took one-half the crop. *Weber*: Light fall of snow during winter made water scarce for irrigation; no rain during summer; all crops short; grasshoppers in portion of county.

WASHINGTON.—*San Juan*: Better yield than expected.

WYOMING.—Crops of all kinds nearly destroyed by grasshoppers.

CORN.

This crop promises an outturn of over 200,000,000 bushels, or nearly 10 per cent. greater than last year, with an acreage increased less than 3 per cent. In New England the crop fell off 9 per cent., or nearly 1,100,000 bushels. The growing conditions were quite unfavorable, especially in the northern counties; drought shortening the yield during the season, and premature frosts at its close. The Middle States report the same general condition with local storms as a reason for a decline of over 2,300,000 bushels, or 3 per cent. in their yield, their acreage being

nearly the same as last year. The South Atlantic States, with an acreage substantially unchanged, report an addition of 1,000,000 bushels, or over 1 per cent. in their aggregate product. The conditions of growth were very variable, the favorable and unfavorable reports about balancing each other; quite a number of local storms were reported. The Gulf States report many local disasters from opposite extremes of drought and excessive rainfall upon a slightly reduced acreage. Their aggregate yield falls off 22 per cent., or nearly 27,000,000 bushels. In the four Southern inland States there is an increase of 30 per cent., or nearly 35,000,000 bushels. In Arkansas the yield is very irregular; many large corn-growing counties reporting reduced products. In the three other States of this section the average is more uniform; the acreage is considerably increased. In the States north of the Ohio River the crop has increased over 100,000,000 bushels, or nearly 20 per cent., while Indiana has fallen off. The other States of this section have increased their yield, especially Illinois, in which the enlargement has been enormous. There was considerable increase of acreage in these States, but the enlarged production was mostly due to increased product per acre. Yet even from this favored section numerous complaints of local injuries have been received. The States west of the Mississippi show an advance of nearly 25 per cent., or 100,000,000 bushels. In these States the area has greatly increased, as also the product per acre. Nebraska reports 45 bushels per acre, the largest average in the Union. The Territories show a marked enlargement of area under corn with a large average product.

The following extracts from correspondents are given :

MAINE.—*Knor* : About three-fourths of a crop; cold weather; considerable replanted. *Penobscot* : A large percentage of loss in consequence of cold and wet weather. *Aroostook* : Quantity of crop reduced from cold and backward spring. *Piscataquis* : Injured by frosts from 25 to 50 per cent. *Oxford* : Injured by frost. *York* : On poor land this crop a failure; average yield on good land 64 bushels per acre. *Cumberland* : Yield much lowered from frost on the 25th and 26th of September.

NEW HAMPSHIRE.—*Carroll* : Crop badly injured by frosts. *Cheshire* : Crop injured by frosts. *Sullivan* : Crop much injured by frosts. *Rockingham* : Yield from 10 to 15 per cent. below average; cause, wet spring.

VERMONT.—*Addison* : Except on bottom lands yield is light from continued drought. *Caledonia* : Badly injured by frost. *Grand Isle* : Injured by frost. *Chittenden* : All crops good. *Orleans* : Crop poor and inferior.

MASSACHUSETTS.—*Berkshire* : Crop short in consequence of late planting and frequent changes of weather.

NEW YORK.—*Cattaraugus* : Injured by early frosts. *Ontario* : Light in consequence of drought. *Westchester* : Did not fill out well for want of rain. *Madison* : Injured by drought. *Otsego* : Injured by frost. *Saratoga* : Injured by frost. *Sullivan* : Season too cold and wet. *Wayne* : Average crop.

NEW JERSEY.—*Mercer* : Injured by severe storms. *Morris* : Injured by strong winds. *Salem* : Below average. *Middlesex* : Injured in quality and quantity.

PENNSYLVANIA.—*Beaver* : Large amount of soft ears. *Berks* : A good average. *Butler* : Good, but cool weather softened much of it. *Centre* : Good; somewhat injured by frost. *Crawford* : Injured by frost. *Fayette* : Abundant. *Indiana* : Below expectations, but sound. *Lchigh* : Injured by drought. *Lycoming* : Fair, with a part

soft. *Mifflin*: Good, though a dry season. *Sullivan*: Short ears, and soft. *Bucks*: Injured by rain and wind to the extent of 10 bushels per acre. *Montgomery*: Yield not as large as anticipated. *Tioga*: Shortened by drought. *Venango*: Husks out badly. *Luzerne*: Average.

DELAWARE.—*Kent*: Fine.

MARYLAND.—*Worcester*: Below general average, in consequence of drought followed by severe storms. *Alleghany*: Prospects good. *Montgomery*: Very fine. *Calvert*: Short on account of drought. *Queen Anne*: Has not turned well; weather too dry. *Somerset*: The early crop was very fine; the late not near so good, injured by wind and rain. *Talbot*: Injured by rain and storms.

VIRGINIA.—*Bedford*: Upland crop injured, bottom crop good. *Dinwiddie*: Cut short by drought. *Fluvanna*: Unusually good. *Floyd*: Injured by worms and very short. *Hanover*: Early plantings yield 33½ per cent., later 85 per cent. of average crop. *Henrico*: Very near an average. *Highland*: Cut short by drought. *Northumberland*: Much injured by drought. *Rappahannock*: Five per cent. below average. *Richmond*: Cut by drought. *Rockingham*: Drought cut off crop. *Campbell*: Measuring up better than expected. *Gloucester*: Cut short by drought; quality good. *Halifax*: Short from drought; quality good. *Middlesex*: The smallest crop since 1865.

NORTH CAROLINA.—*Forsyth*: One-third larger than last year. *Gaston*: Very light yield. *Greene*: Cut short half by drought. *Person*: Extra good on low lands, very poor on uplands; drought. *Transylvania*: Injured by great rains. *Camden*: All crops short by storm of August 18. *Carteret*: Short from storm of August 18. *Currituck*: Crop never recovered from effect of storm of August 18. *Martin*: Short. *Pasquotank*: Injured by August storm. *Wilson*: Good average crop.

SOUTH CAROLINA.—*Barnwell*: Good. *Clarendon*: Light and small in weight. *Union*: Drought has cut off crop from one-half to three-fourths average; quality inferior. *Horry*: Sounder and better than last year. *O'Connor*: Dry weather cut off the crop 25 per cent. *Laurens*: Crop three-fourths of average. *Lexington*: Below an average.

GEORGIA.—*Baker*: Sufficient for home use. *Cobb*: A good yield. *Columbia*: Dry and hot summer cut short the crop. *Jackson*: Upland damaged by drought; bottomland good. *Jasper*: Very poor. *Thomas*: Injured by rain. *Walton*: Three-fourths of crop. *Warren*: Not good. *Brooks*: Very good yield. *Clayton*: Upland poor; bottomland good. *Wilkes*: Upland of no value.

FLORIDA.—*Jackson*: Much damaged by floods. *Leon*: Short from heavy rains and rot. *Suwannee*: Fair. *Wakulla*: Rotted. *Marion*: Much injured by rain, but fair. *Washington*: Heavy incessant rains damaged the crop seriously. *Hamilton*: Much injured by drought and very short.

ALABAMA.—*Autauga*: Good. *Calhoun*: Good; about average. *Clay*: Average last year 80, this year 100. *Crenshaw*: Damaged by rain. *Elmore*: Injured by rains. *Greene*: Somewhat rotten. *Lawrence*: Upland poor; lowland better; difference caused by drought. *Marengo*: One-sixth of the crop rotten. *Monroe*: Much injured by rain and rot. *Russell*: Very light; drought. *Clarke*: Upland poor; bottomland averages 105 bushels per acre. *Dallas*: Badly damaged by rain and storms. *De Kalb*: Yield good; quality below average. *Hale*: Full average.

MISSISSIPPI.—*Amite*: Inferior on account of storms. *Chickasaw*: Short and inferior. *Grenada*: Fifty per cent. short; quality inferior; drought. *La Fayette*: In some localities 45 bushels to the acre; in others 8. *Noxubee*: Average better than last year. *Prentiss*: Injured by rain. *Scott*: Better than for ten years. *Tishomingo*: Average. *De Soto*: Fine. *Tippah*: Very fine. *Benton*: Very fine in quantity and quality. *Holmes*: Yield light and inferior.

LOUISIANA.—*Calcasieu*: Much damaged by drought. *Washington*: Far below the average. *Cameron*: From 10 to 25 bushels per acre. *Franklin*: Yield better than anticipated. *Bossier*: Failure from drought.

TEXAS.—*Brazos*: One fourth of a crop. *Burleson*: Light. *Dallas*: Average 15 bushels per acre. *Freestone*: Failure from drought. *Grayson*: One-half average;

drought. *Karnes*: Yield from 5 to 7 bushels per acre; drought. *Lamar*: Failure; drought. *McLennan*: Much of the crop unfit for feed. *Mason*: Failure; drought. *Medina*: Failure; drought. *Morris*: Twenty bushels per acre. *Tarrant*: Injured by drought. *Titus*: Light yield; enough for home consumption. *Victoria*: Reduced half by drought. *Walker*: Very light. *Washington*: On account of drought the yield is but 10 bushels to the acre. *Webb*: Very small average. *Burnet*: Small yield on account of drought. *Fannin*: The most inferior crop raised since 1860. *Williamson*: General failure from drought. *Austin*: Variable, but on the average, good. *Cameron*: Half destroyed by overflow of the river. *Collier*: Short from drought. *Montague*: Loss of 50 per cent. compared with last year; drought. *Red Ricer*: Light. *Nacarro*: Light and inferior; affected by smut.

ARKANSAS.—*Boone*: Twenty-five per cent. increase. *Marion*: Short on account of drought. *Polk*: Fifty per cent. loss from drought. *Prairie*: Complete failure. *Van Buren*: Injured by storms. *Johnson*: Good rains in September and October gave a good crop. *Grant*: Inferior to any crop in ten years except that of 1874. *Franklin*: Deficient in quality and quantity; enough for home consumption.

TENNESSEE.—*Anderson*: Average three-fourths of a crop. *Bradley*: Averages 70 per cent. *Carroll*: Seriously damaged by rains. *Carter*: Short one-half. *Lawrence*: Better than last year. *Marion*: Cut short by drought. *Meigs*: Ruined by drought. *Smith*: Three-fourths average. *Unicoi*: Average. *Coffee*: Injured by drought. *Greene*: Injured by drought.

WEST VIRGINIA.—*Doddridge*: Yield shortened by drought; quality good and well cured. *Jackson*: Heavy crop; better eared than last year. *Morgan*: Largest crop for years. *Ohio*: Remarkable season for all crops. *Summers*: Best for years on bottom lands; half crop on uplands. *Ritchie*: Injured by frost September 20. *Braxton*: Decreased yield and inferior quality. *Greenbrier*: Small yield; drought and thin stand. *Boone*: Large yield on rich lands; quality excellent. *Brooke*: Yield not so large as anticipated but quality good. *Roan*: Full crop. *Nicholas*: About half average.

KENTUCKY.—*Boyd*: Shortened by drought. *Bracken*: Matured nicely. *Breckenridge*: Badly blown down by September storms. *Garrard*: Average yield and better quality than last year. *Kenton*: Replanted; did not mature; first planting, a poor stand. *Marshall*: One-third blown down. *Muhlenburg*: Much blown down and rotting. *Nicholas*: Very light on thin lands. *Ohio*: Quality impaired by August storms. *Boone*: Below average; badly blown down. *Graves*: Excellent. *Johnson*: Fair. *Pendleton*: Did not mature well; injured in shock. *Union*: Heavy yield but condition a little under average. *Fulton*: Better than last year. *Mercer*: Yield reduced 20 per cent. by storms; some of the crop heated in shock. *Ballard*: Considerably blown down. *Spencer*: Badly damaged in many localities by storms. *Taylor*: Drought made it about half crop.

OHIO.—*Athens*: Late planted cut down by early frosts. *Coshocton*: Yield much better than expected; replanted escaped frost. *Crawford*: Serious injury by September frosts. *Darke*: Badly blown down; much of it soft. *Geauga*: Poorly filled and lighter than expected. *Harrison*: Yield about the same as last year but 10 per cent. deficient in quality. *Knox*: Crop overestimated; large amount soft and shrunken. *Licking*: Smaller yield than was expected; badly blown down; late-planted injured by frosts. *Lorain*: Not so good as expected. *Miami*: Ready for the crib. *Meigs*: Quality impaired by early frosts. *Pickaway*: Lighter yield than was anticipated; drought and storms. *Preble*: Very light and chaffy; not one acre in a hundred as good in quality as last year. *Scioto*: Above average. *Tuscarawas*: Escaped frost. *Union*: Much damaged by September frosts. *Wayne*: Unusually large crop, but quality inferior to last year. *Williams*: Much of the early-cut molded in shock. *Wyandot*: Did not mature well. *Allen*: Light. *Lucas*: More soft ears than usual. *Champaign*: Badly blown down; did not mature well. *Sandusky*: Imperfectly matured. *Clermont*: Cut short by drought. *Warren*: Twenty per cent. below average.

MICHIGAN.—*Clinton*: Light and damaged in shock. *Ottawa*: Injured by hot, sultry weather, causing it to sprout and heat. *Tuscola*: Drought. *Manistee*: Yield curtailed by drought. *Bay*: Injured by drought and early frosts. *Eaton*: Crop above average both in yield and quality. *Muskegon*: Very light yield. *Mason*: Very poor crop. *Wayne*: Considerably sprouted in shock. *Wexford*: Much below average.

INDIANA.—*Carroll*: Unfavorable season; entire failure in some localities. *Decatur*: Escaped frost. *Dubois*: Twenty per cent. blown down and rotting. *Franklin*: Poorest for many years. *Hancock*: Matured well. *Jay*: Injured by wet. *Ripley*: Below average; quality good. *Marshall*: Injured by drought and hailstorm. *Shelby*: Short crop; badly blown down. *Warrick*: Much blown down and rotting. *Dearborn*: Injured by frost in some localities. *Harrison*: Cut short by drought. *Noble*: Much of it soft. *Pike*: Below average. *Steuben*: Damaged in shock; early-husked damaged in crib. *Jefferson*: Good crop. *Orange*: Lighter than last year. *Warren*: Injured by frost; grain chaffy. *Greene*: Injured by storms. *Hamilton*: Does not come up to our expectations; much of it down. *Lawrence*: Excessive rains caused some to sprout on the cob. *Marion*: Good; some blown down. *Tipton*: Much damaged by frost. *Madison*: Ten per cent. soft. *Parke*: In the south half of county it is badly blown down.

ILLINOIS.—*Clinton*: Some fields injured by chinch-bugs. *De Kalb*: Injured 20 per cent. by September frosts. *Fayette*: Splendid. *Hancock*: Matured well. *Saline*: Damaged 10 per cent. by storm. *Stark*: Early frosts lessened the yield. *Wabash*: Blown down in many localities. *White*: Injured 25 per cent. by storm. *Woodford*: Chinch-bugs took one-fifth. *Kankakee*: Below last year in yield and quality. *La Salle*: Twenty-five per cent. damage by frost in September. *Stephenson*: Excellent. *Wayne*: Almost a failure in the north half of county. *Kendall*: Yield impaired by early frosts. *Putnam*: Damaged by frosts. *Shelby*: Better than was expected. *Lee*: Largest crop ever raised in the county. *Whiteside*: Not so good as expected. *Clark*: Above average, but much of it soft. *Edgar*: Frost injured late planted. *Greene*: Lighter than was expected. *Saline*: Damaged 10 per cent. by storms. *Winnebago*: Full average. *Carroll*: Largest for years. *Edwards*: Injured 25 per cent. by being blown down. *Grundy*: Reduced 25 per cent. by drought and frosts. *Iroquois*: Cut short 20 per cent. by early frosts. *Jefferson*: Large yield, but quality impaired by being blown down. *Ogle*: Not so large as last year. *Coles*: Some damage by frosts. *McLean*: Not so good as was expected; frost injured the crop. *Marion*: Light yield; drought and chinch-bugs. *Morgan*: Early planted injured by hot July winds. *Johnson*: Best for several years. *Livingston*: Some fields hurt by chinch-bugs. *Peoria*: Slightly injured by early frost.

WISCONSIN.—*La Fayette*: Late planted injured by drought and early frosts. *Rock*: Full average. *Pierce*: Cribbed in good condition. *Trempealeau*: Very good. *Racine*: Quality 25 per cent. better than last year. *Walworth*: Fair yield, but inferior quality. *Sauk*: Injured by wet in July and drought in fall. *Crawford*: Drought reduced it to a third. *Dane*: Injured by drought and early frosts. *Dunn*: Yield much less than was anticipated. *Washington*: Injured some by August drought.

MINNESOTA.—*Kandiyohi*: Better than usual. *Ramsey*: Ripened nicely. *Wadena*: Late planted soft. *Wright*: Good yield. *Olmstead*: Chinch-bugs and drought. *Fillmore*: Above average. *Martin*: Drought reduced it a fourth. *Otter Tail*: Damaged 15 per cent. by heavy storms. *Pope*: Matured well; fair. *Polk*: Frost of June 9 almost destroyed early planted; September frosts took late planted. *Rock*: Excellent crop. *Stevens*: Yield cut short by early frosts and cool weather.

IOWA.—*Grundy*: Quality 25 per cent. below last year's crop. *Pocahontas*: Yield lessened by drought. *Woodbury*: Good crop. *Johnson*: Much below expectation; dried up prematurely. *Lonia*: Good. *Marion*: Badly blown down; what is standing is of good quality. *Monroe*: Better than was expected. *Ringgold*: Quality not equal to last year. *Lee*: Average. *Buena Vista*: Fair. *Clinton*: Good. *Franklin*: Shortened by drought. *Greene*: Good average. *Henry*: Shortened by drought. *Kos-*

south: Far below expectations. *Polk*: Fair. *Des Moines*: More moldy than usual. *Floyd*: Superior. *Tama*: Much of it blown down. *Howard*: Much less than expected; drought. *Linn*: Excellent. *Washington*: Lighter than was expected.

MISSOURI.—*Christian*: Matured nicely. *Carter*: Best yield in ten years. *Caldwell*: Chinch-bugs seriously injured it; late planted; two-thirds of a crop. *Grundy*: Shortened by chinch-bugs. *Howard*: Some fields will yield 100 bushels per acre. *Howell*: Best crop in four years. *Macon*: Best yield in twenty years. *Morgan*: Above average. *Putnam*: Fine. *Vernon*: Very dry. *Washington*: Badly blown down; dry fall prevented much injury. *Johnson*: Very fine. *Platte*: Housed in fine condition. *McDonald*: Reduced by drought. *Scotland*: Good. *Clay*: Average yield and superior quality. *Grant*: Less than last year; quality excellent. *La Fayette*: Fine, except late planted, which is soft. *Nodaway*: Excellent and large. *Pettis*: Best of all crops.

KANSAS.—Shortened by drought; quality good. *Dickinson*: Short; drought. *Marion*: Not so good as was expected; ears quite small. *Reno*: Light, *Jackson*: Very light. *Jefferson*: Average on bottom lands. *Ellis*: Light, but of superior quality. *Saline*: Crop cut short by drought and chinch-bugs. *Montgomery*: Shortened by drought and chinch-bugs.

NEBRASKA: *Boone*: Shortened 10 per cent. by drought. *Holt*: Smallest since 1875; no rain since July 3. *Hamilton*: Damaged 15 per cent. by drought. *Knox*: Much of it planted on sod and produced no grain; drought. *Sarpy*: Light yield and inferior; drought. *Greeley*: Good. *Lancaster*: Large, and of good quality. *Antelope*: Good. *Cass*: A powerful sight of nubbins and a heap of fodder. *Platte*: Acreage nearly double that of last year; yield shorter than was anticipated. *Saunders*: Somewhat reduced by chinch-bugs and hot weather.

CALIFORNIA.—*Contra Costa*: Silk eaten by bugs; did not fill well. *Solano*: Damaged by cold weather in spring and hot spell during summer. *Yuba*: Good average crop. *Placer*: Good crop.

NEVADA.—*Esmeralda*: But little raised.

OREGON.—*Columbia*: Cold spring rains and summer drought cut all crops short. *Clackamas*: Excellent and of good quality. *Polk*: But little raised; will not ripen sufficiently to keep during winter.

COLORADO.—*Larimer*: Much better than in former years.

UTAH.—*Beaver*: All crops suffered by drought. *Kane*: Dryest season since the organization of Territory; yield of all crops lower than usual. *Weber*: Drought.

DAKOTA.—*Brookings*: A new county; this year's crop raised on new breaking. *Union*: Injured by early frosts. *Moody*: Damaged by early frost.

NEW MEXICO.—*Doña Ana*: Mostly a failure.

INDIAN TERRITORY.—*Cherokee*: Cut short by drought. *Choctaw*: Almost a failure.

OATS.

The oats crop of 1879 falls about 12 per cent. short of its predecessor, the acreage having been reduced nearly 4 per cent. In the New England States the acreage fell off about 3 per cent., while the gross yield shows a slight increase, less than 1 per cent. In this section there is some complaint of drought, but the quality of the crop is considerably above last year. The Middle States reduced their acreage 9 per cent. and their total product 12 per cent. The conditions of growth here were about the same as in New England, with some local disasters from hailstorms, &c. The quality of the crop is above average, except in Delaware, where it is estimated at 3 per cent. less than last year.

The South Atlantic States report an acreage 1 per cent. less than the previous year, with a decline of 7 per cent. in production. In the Ches-

apeake region the quality of the crop was poorer than last year, but in the three other States it has improved. Drought is the leading complaint in this section. Special mention is made of the "rust-proof" variety as specially adapted to the Southern climate. The Gulf States increased their acreage 2 per cent., but their total product shows a decline of nearly 20 per cent. The conditions of growth were far less favorable than last year, the leading complaint being of the drought. The quality of the crop regularly declined from the Atlantic to the Mississippi River.

The Southern inland States decreased their breadth of land in oats about 4 per cent., and obtained a product 25 per cent. less than in 1878. Drought was here particularly severe upon this crop. The quality here shows a marked deterioration. The States north of the Ohio River devoted 5 per cent. less area to oats than in 1878, and their product fell off 12 per cent. A slight average increase in the yield per acre and an improved quality are noted in Michigan and Wisconsin, but this goes but little way in counteracting the heavy decline in the three more southern States, where the quality is poorer than last year; drought the leading cause.

The States west of the Mississippi slightly increased their area, but their total product fell off 13 per cent. Minnesota and Iowa report an improved quality, but the other three States a deterioration. On the Pacific coast the increase of 6 per cent. in acreage in California was more than counteracted by a decline of 10 per cent. in Oregon, but both States report a marked increase in the yield per acre, and hence the total yield is nearly 12 per cent. greater than last year. Several counties report fields averaging 75 bushels per acre. The quality was above average.

Colorado, Nevada, and the Territories, taken together, report about the same acreage as last year, but their total yield increased about 25 per cent. In the northern regions of Dakota and Washington the crop was remarkably fine, as also in Colorado, where one county reports fields averaging 76 bushels per acre. But in the southern regions of New Mexico and Utah drought was severely felt. On irrigated lands the crop was all that could be desired, but where left to the natural moisture of the season the yield was very short.

The following extracts from correspondence are given:

MAINE.—*Oxford*: A good crop.

NEW HAMPSHIRE.—*Cheshire*: Full weight, but small yield.

MASSACHUSETTS.—*Dukes*: Somewhat injured by dry weather during the early part of the season.

NEW YORK.—*Genesee*: Yield rather light, but quality very fine. *Putnam*: Not sufficient thrashed out to form an estimate. *Sullivan*: An unusually large crop, and of the best ever raised in the county.

NEW JERSEY.—*Morris*: The late crop is better than the early. *Salem*: Injured by hail-storm in June. *Cumberland*: Above an average crop, full weight. *Warren*: Fine crop, of superior quality.

PENNSYLVANIA.—*Lehigh*: Better in both yield and quality than for some years. *Bearer*: Light crop.

MARYLAND.—*Cecil*: Scarcely an average yield per acre, but is heavier than usual. *Caroline*: Both the spring and summer varieties turned out well. *Howard*: Damaged in stack by unfavorable weather of the past six weeks. *Prince George's*: Not cultivated to any extent.

VIRGINIA.—*Brunswick*: The quality is very good. *Orange*: Below an average yield. *Acomac*: Smaller crop than for many years; almost a failure. *Dinwiddie*: Yield small owing to the drought, but quality the best for years; a plump, heavy berry. *James City*: Winter crop very small, but spring unusually good. *Northampton*: Not more than half a crop, owing to drought. *Hanover*: Yield reduced by winter-killing. *Highland*: Below average.

NORTH CAROLINA.—*Davidson*: Winter-killed. *Nash*: An important crop here, and much attention is being devoted to it.

SOUTH CAROLINA.—*Orangeburgh*: Our principal small-grain crop is being extensively planted. *Clarendon*: Yield per acre about 30 bushels; 10 per cent. better than last year.

GEORGIA.—*Decatur*: One of the principal crops of this section. *Murray*: Cut short by drought. *Whitfield*: Small yield per acre compared with other years. *Bartow*: Almost entire failure from drought. *Carroll*: The red rust-proof variety is a blessing to us. *Brooks*: Quality rather better than was expected. *Jackson*: About an average crop.

ALABAMA.—*Colbert*: Very good in both yield and quality.

MISSISSIPPI.—*Grenada*: A full crop, averaging 20 bushels per acre. *Copiah*: That planted in the fall is very good. *Choctaw*: Very good.

TEXAS.—*Rusk*: The red rust-proof variety is our main small-grain crop. *Wise*: Worth about 50 cents per bushel.

ARKANSAS.—*Marion*: Owing to dry weather the crop was far below an average. *Montgomery*: Cannot give the yield, as we feed them without thrashing, in the sheaf.

TENNESSEE.—*Grainger*: Affected by drought, but the quality is good. *Lawrence*: Seriously injured by severe drought; crop inferior generally. *Rutherford*: Yield greatly reduced by drought.

WEST VIRGINIA.—*Braxton*: Poor crop.

KENTUCKY.—*Barren*: Not raised as a general crop on account of rust. *Calloway*: Failure. *Johnson*: Too short for cutting. *Jessamine*: Light yield. *Pendleton*: Many fields to be cut. *Nelson*: Condition not good. *Henderson*: Small acreage and poor yield and quality.

OHIO.—*Lorain*: Injury by July storms decreased the yield. *Wood*: Very good crop.

MICHIGAN.—*Antrim*: Drought injured the crop.

INDIANA.—*Bartholomew*: Drought injured the crop 80 per cent. *Franklin*: Ripened unevenly; poor grain.

ILLINOIS.—*Boone*: Injured by drought. *De Kalb*: Remarkably fine. *Madison*: Drought. *Jackson*: Almost a failure. *Richland*: Poorest crop for many years. *Jersey*: Light yield.

WISCONSIN.—*Crawford*: Big crop. *Racine*: Good yield; weight 32 to 40 pounds. *Rock*: Good yield; small acreage. *Walworth*: Fair crop.

MINNESOTA.—*Fillmore*: Fair average crop. *Jackson*: Excellent, both in quality and quantity. *Ramsey*: Lighter in yield and weight than last year. *Todd*: Fine crop. *Steele*: Equal to any crop ever raised. *Renville*: Becoming one of our standard crops.

IOWA.—*Fremont*: Good crop. *Hardin*: Full weight, but yield short. *Howard*: Promise well. *Mitchell*: Light yield. *Clarke*: Large crop.

MISSOURI.—*Johnson*: Good crop; heavy grain. *Macon*: Fair crop. *Marion*: Half crop. *Maries*: Poor crop. *Perry*: Very inferior.

KANSAS.—*Lane*: Did not mature; drought. *Marion*: But few fields cut. *Ottawa*: Light crop; drought and chinch-bugs. *Saline*: Yield very light. *Stafford*: Failure.

NEBRASKA.—*Hamilton*: Poorly filled. *Sarpy*: Not up to our expectation.

OREGON.—*Grant*: Best crop known for years; some fields yielded 75 bushels per acre.

COLORADO.—*Larimer*: Very fine quality; some fields yielded 76 bushels per acre.

DAKOTA.—*Lake*: Excellent crop.

NEW MEXICO.—*Taos*: Injured by drought.

UTAH.—*Box Elder*: Irrigated lands yielded a splendid crop; dry fields a poor crop. *Davis*: Good on irrigated lands. *Wahsatch*: Better crop than last year.

WASHINGTON.—*San Juan*: Excellent crop.

COTTON.

The returns of November 1 to this department indicate an increase of condition of cotton during the month of October. Unfavorable weather prevailed in Georgia and Alabama, but in all the other States the season had been propitious. Frosts were felt in most sections, but were not very detrimental.

The indicated "yield per acre," taken at the date of our returns, gives a pretty accurate data of the actual outturn of the crop, and, although the picking season may extend to December 15, the bulk of the crop is now saved.

The returns indicate a yield for the whole cotton belt of 176 + pounds of lint per acre against 191 last year. This yield, estimating the increased area in cotton to be 2 per cent., would make a deficit in this year's crop of 290,000 bales of 450 pounds each as compared with that of 1878. The principal cause of this deficit is the great drought which prevailed in Texas and reduced her yield nearly 35 per cent. In all the South Atlantic States there is more or less decline. In the States bordering on the Mississippi River there is considerable increase. Louisiana and Mississippi each show the effects of the favorable fall, and make decided gains over last year. Arkansas and Tennessee equal their magnificent yield of 1878.

Reference is made to the table in rear of this report for the yield returned from each State. The following extracts from correspondence are given:

NORTH CAROLINA.—*Columbus*: Damaged by rust in some localities, especially where fertilizers were used. *Gaston*: Has had a very precarious life, extending to the late date of October 25. *Greene*: Has improved wonderfully; where there is no rust the top crop is good. *Harnett*: Season so far favorable to save lint. *Pamlico*: Yield per acre will exceed last year on an increased acreage. *Pender*: About three-fourths picked. *Stanly*: Season good and lint fine; crop a full average. *Wayne*: The improvement has exceeded expectations; one-third of crop not yet gathered. *Cleveland*: The dry weather during the past two months has increased the yield. *Edgecomb*: Worst crop in thirty-six years. *Sampson*: Better than was expected. *Currituck*: Short on account of storm in August and cool weather in September. *Martin*: Weather never more favorable; lint clean and white. *Pitt*: Late cotton killed by frost on night of October 24. *Wilson*: Has improved very much; top crop recovered from the drought and matured well; saved in fine condition, and nearly all picked. *Bertie*: Short, on account of August storm.

SOUTH CAROLINA.—*Clarendon*: A hard frost just now would kill all the bolls grown since the late rains. *Newberry*: Suffered severely from the two extremes, wet and dry. *Beaufort*: Diminished by caterpillar visitations. *Colleton*: Weather fine for gathering. *Darlington*: Weather good and seven-eighths of crop picked. *Laurens*: As picking progresses prospects brighten. *Horry*: Picking about over; seriously damaged by rust. *Oconee*: Injured by rains. *Pickens*: Late crop heavy, but injured by frost. *Lexington*: Below an average; quality good, and the crop thus far gathered in good condition.

GEORGIA.—*Baker*: Weather unfavorable for picking; too much wind and rain. *Colquitt*: But few days of sunshine during October. *Decatur*: Open cotton has sprouted and is growing in the bolls from constant rain. *Forsyth*: Injured considerably by wet weather. *Grinnett*: Fully up to the September indications. *Harris*: Sprouting in the boll. *Jackson*: Will average but little over half a crop. *Jasper*: Heavy rains have done much harm. *Newton*: Two slight frosts, but no damage done. *Schley*: Injured by two weeks' heavy rain. *Ferrell*: Weather very unfavorable during the past twenty days. *Walton*: A long spell of cool, wet weather has retarded opening and picking. *Warren*: Bad month for cotton, rains causing it to rot, and weather unfavorable for picking. *Cobb*: Some damage done by the recent heavy rains, but crop much better than was anticipated. *Columbia*: Will turn out pretty well, owing to lateness of frost. *Lee*: Since last report most unfavorable season for twenty years; bolls rotted and open cotton sprouted. *Lincoln*: Too much rain, and cold, cloudy weather during the past two weeks. *Marion*: Seriously injured by rains during gathering season. *Murray*: With good weather for two weeks the crop will be greatly increased. *Thomas*: Cut short by rains and worms. *Brooks*: Much lost from wet weather. *Clayton*: Quality will not be very good on account of rains. *Coweta*: Much blown out by winds, and rains have caused much sprouting; there is a great deal yet to open which may be caught by frost and ruined. *Wilkes*: The made crop nearly all gathered; there are yet large quantities of bolls on bottoms, the opening of which depends on future weather. *Hart*: Crop increased by favorable fall weather. *Macon*: Damaged by continuous rains for past five weeks. *McDuffie*: Damaged by rust and wet weather. *Muscogee*: Fall mild, but has not increased the cotton crop. *Putnam*: Just enough frost to cause shedding of leaves; with good opening weather will save nearly all the top crop. *Wilkinson*: Damaged by rains, which have caused it to rot. *Early*: Picking progressing slowly; cotton pretty, but very light. *Gordon*: One-fourth yet in the field. *Heard*: Sprouted in the bolls; too much rain. *Troup*: Promises much better than about the first of October. *Worth*: Much sprouting on account of excessive rains.

FLORIDA.—*Alachua*: Rains and worms have done much damage to the crop; the late crop amounts to nothing; deterioration of seed is reducing the yield very much of late years. *Bradford*: Heavy and continued rains have caused a large falling off both in quantity and in quality. *Calhoun*: The promising prospect has been injured by rains and wind. *Marion*: Much has sprouted from heavy rains. *Columbia*: Staple injured by rains, much having rotted in the fields. *Jackson*: Two-thirds of open cotton in fields an entire loss, and balance greatly damaged in quality; cause, continued heavy rains. *Leon*: What little has reached maturity has been ruined by rains; such a fall was never known here. *Suwannee*: The longest wet spell ever known here, and the caterpillars have damaged what cotton was left after the drought. *Wakulla*: Short; caused by worms and wet weather. *Hamilton*: Seriously injured by rains and caterpillars. *Washington*: Damaged by bad weather.

ALABAMA.—*Autauga*: Damaged by rain and wind; has been raining for twenty days; much blown out and bolls sprouting. *Bibb*: Prospect gloomy; worms, rain, and wind. *Chambers*: Injured in quantity and quality by a long spell of wet weather. *Crenshaw*: Damaged by storms and too much rain. *Lawrence*: Poorest in several years, bottom crop fine, middle crop about half an average and very little top crop, if any; a frost on the 23d of October stained the cotton very much. *Marerg*: Excessive weather; crop damaged 15 per cent. since last report. *Monroe*: About four weeks of rain; bolls

rotted and quality materially injured. *Russell*: Weather very unfavorable; crop also injured by the boll-worm. *Clarke*: Cut off by worms and excessive rains. *Perry*: Two-thirds gathered before the storms of wind and rain; twenty per cent. of outstanding crop damaged. *Calhoun*: Hard to tell what will be the exact amount per acre; some making 500, others not 200 pounds per acre. *Clay*: Doing much better than was expected two weeks ago. *Elmore*: Damaged by wind and rain. *Shelby*: Staple injured by wind and rain. *Dallas*: About one-third of crop still in the field and quality badly damaged by heavy rains. *De Kalb*: Rainfall very heavy and much damage done; top crop developing very well under present favorable weather. *Hale*: Average reduced by rust and caterpillars. *Lee*: Greatly damaged by rain, rust, and caterpillars. *Saint Clair*: Fall late and favorable; damaged some by October rains. *Bullock*: Seriously damaged by rain; later weather favorable to opening of bolls, and has been set-off to the damage done by flood and winds.

MISSISSIPPI.—*Amite*: Where the worms have not destroyed the leaves it is yet growing and maturing. *Grenada*: Will turn out better than expected, owing to favorable weather for maturing and picking; killing frosts on the nights of the 23d and 24th ultimo finished the top crop. *Marshall*: Fully one-half housed and weather good; quality will be better than usual. *Norube*: Yields more clear lint to the 100 pounds than previous years. *Panola*: Month very dry, and up to yesterday warmer than September; worms have damaged the promise of one month ago. *Prentiss*: Damaged by rains. *Rankin*: Worms worse than expected; weather fine for gathering. *Scott*: Better than anticipated one month ago. *Clay*: Rain and warm weather has caused much falling and sprouting of bolls. *Falabusha*: Unprecedented good weather for gathering; two-thirds gathered and quality excellent. *Chickasaw*: Damaged by frequent and heavy rains; weather now favorable for gathering. *Newton*: Bolls rotting and worms doing some injury. *Smith*: Late cotton destroyed by worms; picking unusually early. *Scott*: Better than was expected a month ago. *Copiah*: No rain for two months; three-fourths of the crop gathered. *Benton*: Weather splendid, crop opening finely, and prospect good for all the fruit maturing. *Holmes*: Better than last year, but short of an average crop. *DeSoto*: Have made a good crop. *Leflore*: Weather very favorable. *Sumner*: Crop over an average and weather fine. *Tate*: Injured by frost and boll-worm. *Winston*: Indicates a better crop than was expected. *Choctaw*: Good; no disasters from frost, &c.

LOUISIANA.—*Bienerville*: Top crop cut short by drought. *Concordia*: Picking season good; lint excellent and quality fine. *Madison*: Late cotton matured well and is being saved in excellent condition. *Richland*: Remarkable weather for gathering, and will fully make up for loss by drought; being saved in excellent condition. *Washington*: Season very favorable; crop 10 per cent. in excess of last year's. *Bossier*: As good a yield per acre as ever made in this county. *Franklin*: In some localities the yield is 1,800 pounds seed cotton to the acre; in others will not reach 700 pounds.

TEXAS.—*Blanco*: Have had a drought of almost one year's duration; late rains have made a top crop. *Rozos*: Growing and may make a top crop; worms have eaten about two-thirds of the crop; quality better than last year. *Dallas*: Has improved; weather good; quality fine, but little trash and no rains to stain it. *DeWitt*: Almost a failure from ravages of the worm. *Freestone*: Drought lasted four months. *Hill*: Will all be picked and in the market in a few days. *Karnes*: There may be a small top crop made yet. *Kaufman*: Turning out better than was anticipated; picking will be over earlier than usual. *Lamar*: Will make more to the acre than last year. *Titus*: The unprecedented late and open fall has enabled farmers to secure the bulk of their crop without rain. *Trinity*: Drought still prevails; cotton maturing rapidly and picking nearly finished. *Washington*: Will be a little over one-fourth of our average crop; quality of staple fine and eagerly sought after by Eastern spinners. *Grimes*: All gathered. *Harrison*: Season favorable for picking; quality generally good. *Somerville*: Late doing well. *Burleson*: Turning out much better than was expected.

Panola: Favorable fall for picking; bulk of crop in good condition. *Polk*: Weather fine; no loss during month from any cause; nearly all gathered. *Victoria*: Plant not as large as usual, but well balled and lint fine. *Navarro*: Nearly all gathered; receipts at Corsicana this year are about 6,000 bales against 20,000 bales at same date last year. *Burnet*: Yield as low as 75 pounds per acre in some localities. *Fannin*: Nearly all gathered and in nice condition. *Wood*: Frost has killed the leaves, but cannot tell yet what effect it will have upon the opening bolls. *Austin*: Proportion of lint to seed very good; crop turning out better than was expected. *Cameron*: Owing to overflow of the Rio Grande, about one-fourth of the crop will not be gathered. *Collin*: Nearly all saved in excellent condition. *Ellis*: No general rain since the 5th of May; many do not get a bale on less than eight acres. *Montague*: Yielding beyond all expectation. *Red River*: Much better than reported last month. *Rockwall*: Better than was anticipated. *Waller*: That sent to market graded very high. *Hopkins*: Fine season for gathering; eighty per cent. of crop picked. *Limestone*: All gathered; will not exceed half an average crop.

ARKANSAS.—*Fulton*: Yield large, staple fine, and best fall for maturing and gathering for years. *Prairie*: So far the most favorable fall ever known; many have their cotton gathered, and picking will be over in ten days. *Sebastian*: Season favorable and quality good. *White*: Weather finest for years; bulk of the crop out and gone to market; an unusual thing for this country. *Boone*: Better than ever before. *Stone*: Has improved materially; late frosts permitting entire top crop to mature. *Van Buren*: Finest crop ever grown in this county; fall delightful for gathering; no cold weather nor rain for past six weeks. *Marion*: Weather good, and crop best ever raised; at least 3,000 bales of 500 pounds each. *Franklin*: Turning out better than was anticipated: fall very favorable for maturing and picking; over half gathered and in good condition. *Howard*: Owing to late fall, nearly all matured and gathered. *Independence*: Opened unusually well, and bulk of crop picked. *Izard*: Gathered, ginned, and marketed a month in advance of previous years, owing to favorable weather. *Johnson*: About five-eighths of crop picked; no rust or worms.

TENNESSEE.—*Bedford*: Season for maturing and gathering remarkably favorable. *Hancock*: Cut short by frost; most of the imported cotton was killed in the boll. *Laurence*: Full average; superior in quantity and quality to crop of 1878; staple fine. *Tipton*: Most favorable season for gathering for many years. *Shelby*: Yielding better and of finer quality than for years. *Henry*: Picking progressing rapidly.

TOBACCO.

Our returns to November 1st from the tobacco-growing States at large indicate a crop equal in volume to 84 per cent. of an annual average crop for the past eight years. Some modification, however, of this estimate may be necessary in our final computation of the crop, as the extent of damage from house-burn and frost is as yet undetermined.

The indicated quality of the entire crop is 2 per cent. better than that of last year. In some sections, notably in Kentucky, a lack of uniformity in size and color is to be observed; a defect resulting from unequal "seasons," from apprehensions of frost that led many to apply the knife too soon, and from the unusual warm weather, which, with overcrowding in the barn, has resulted, in too many instances, in house-burn or fire-fang.

Except in Pennsylvania, where the gain is very decided, and in Indiana, where it is slight, the seed-leaf districts, the North and North-western States show an average yield per acre below that of 1878.

Of the Southern and Western States producing the bulk of tobacco

(the shipping, manufacturing, and smoking), Maryland, North Carolina, and Missouri show a diminished yield per acre from the preceding year; all the others a gain, from 24 pounds in Virginia to 206 in Kentucky.

To the large gain, in the latter, the largest tobacco-growing State in the Union, is to be attributed mainly the increased product of the whole country to within 2 per cent. of that of the previous year.

The following extracts from correspondence are given :

MASSACHUSETTS.—*Hampshire* : Full average crop. *Hampden* : Best quality for many years.

PENNSYLVANIA.—*Bucks* : Superior crop. *Berks* : The little that is raised is very good. *Lycoming* : Light crop and inferior quality. *Westmoreland* : Increased acreage and luxuriant appearance. *York* : Good quality and large yield.

MARYLAND.—*Calvert* : Best quality raised for years.

VIRGINIA.—*Amherst* : Three-fourths crop. *Bedford* : Some very good fields; considerably damaged by September frosts. *Campbell* : Early planted is excellent quality. *Fluvanna* : Very good crop. *Greenè* : General complaint of injury since housing by warm, damp weather. *Halifax* : Yield shortened by drought; quality excellent. *Henry* : Five per cent. destroyed by frost, and about same quantity severely injured; balance of crop is excellent. *Pittsylvania* : About one-fifth of crop killed by frost.

NORTH CAROLINA.—*Forsyth* : Better quality than last year. *Person* : Best cured crop ever raised in the county.

TENNESSEE.—*Dyer* : Heavy crop. *Hancock* : Best for five years. *Henry* : All housed without frost.

KENTUCKY.—*Bracken* : Weather too warm; cured too fast; crop will be red. *Fulton* : Damaged some while curing by hot weather, and some house-burned. *Kenton* : Injured by house-burn; part of crop was cut green, and is curing up dark. *McLean* : Damaged after it was housed by mold on the stem and leaf. *Marshall* : Larger leaf and better body than last year. *Nicholas* : Decreased acreage, owing to scarcity of plants, and season unfavorable for setting them. *Ohio* : Quality impaired by house-burn. *Pendleton* : Most of it damaged by house-burn.

OHIO.—*Athens* : Cut short by early frosts. *Clermont* : Reduced by drought.

INDIANA.—*Jefferson* : Good in some portions of the county.

MISSOURI.—*Howard* : Acreage below average and crop shortened by drought. *Macon* : Good yield and quality. *Montgomery* : Unfavorable season and a poor crop. *Pettis* : Smallest acreage in five years. *Saint Charles* : Badly frosted. *Sullivan* : Badly damaged by hail-storms in many localities. *Wright* : Over average in weight, and nice color.

RYE.

This crop, like other small grains, is most flourishing in our northern latitudes. Its culture, however, is more of a local than general character, which greatly enhances the difficulty of obtaining accurate statistics. Compared with 1878 the crop shows a decline of 4.5 per cent. in acreage, and about 9 per cent. in total yield. There is a slight increase in acreage in the New England and Pacific States, and a decline in all other sections. The falling off in the yield is pretty well distributed through all parts of the country, the heaviest decline being on the Pacific slope, which averages less than 11 bushels against 15 last year. On the Atlantic slope some local injuries from storms are reported, but a more general cause was an unfavorable winter. In the West, drought, chinch-bugs, and local storms are noted as causes of decline.

POTATOES.

With an increase of over 60,000 acres in the breadth planted, the potato crop shows also a great increase in the yield per acre, the average being the largest since 1875. The Gulf States reach their average of last year, and the trans-Mississippi States fall off 20 bushels per acre, but the other sections all show an enlarged production. The New England and Middle States, with little variation in total area, have nearly doubled their yield per acre. Rot and drought are complained of, but the general conditions of growth were fair. The South, as a whole, increased its average product more than enough to overbalance its small decrease in acreage. Different sections complain of drought, excessive rain, or early frost. The States north of the Ohio River, with a considerably larger breadth planted, show an increase of 25 bushels per acre in their average yield. The conditions of growth were, on the whole, favorable. A few cases of injury by Colorado beetles are noted. Favorable mention is made of experimental varieties sent out by the department, especially the Beauty of Hebron and the Victor. The leading cause of the deficiency of the crop west of the Mississippi was drought, though a few cases of injury by insects are noted. The failure seems to have been mostly with late plantings, which were not only cramped by drought but also cut off by early frosts. With a large increase in acreage, the Pacific States increased slightly their average yield per acre.

Table giving the average yield per acre in 1879 of—

States.	WHEAT.	RYE.	OATS.	BARLEY.	BUCK- WHEAT.	COTTON. (Lint.)	POTATOES.	SWEET POTATOES.	LEAF TOBACCO.	HAY.	SORGHUM MOLASSES.
	Bushels.	Bushels.	Bushels.	Bushels.	Bushels.	Pounds.	Bushels.	Bushels.	Pounds.	Tons.	Gallons.
Maine	30	16	18	30	25	30	135	116	1,140	1.14	.....
New Hampshire	32.5	11.7	12	35	21	22	116	116	1,315	1.63	.....
Vermont	36	15.2	12	33	26	23	145	141	1,500	1.11	.....
Massachusetts	36	13	31	31	21	12	104	104	1,400	1.56	.....
Rhode Island	32	18	23	22	22	14	100	98	1,400	1.40	.....
Connecticut	29	13	31	25	20	14	104	91	1,315	1.16	.....
New York	33	12.3	9	32	28	28	89	89	1,439	1.25	.....
New Jersey	34	15.3	12	31	23	23	104	85	1,439	1.34	.....
Pennsylvania	35	13	17	23	20	20	83	85	653	1.08	.....
Delaware	27	13	17	23	18	18	94	61	763	1.20	.....
Maryland	30.6	14.4	12	23	18	18	94	85	556	1.19	.....
Virginia	19	9.2	9	12	156	156	89	85	763	1.19	90
North Carolina	15	7	8	16	143	143	92	88	556	1.39	86
South Carolina	7.5	8.4	5	15	152	152	86	88	556	1.39	91
Georgia	9.3	9	8	15	165	165	64	76	1,560	1.56	85
Florida	8.5	8.4	8	16	135	135	98	131	1,560	1.56	85
Alabama	13	8.4	8	17	135	135	98	70	1,560	1.56	77
Mississippi	18	7.2	11.6	14	175	175	79	93	1,560	1.72	96
Louisiana	15	7.6	14	22	202	202	71	71	1,560	1.72	96
Texas	13	8	25	23.2	180	180	47	68	1,560	1.08	78
Arkansas	24	8	18	23.2	250	250	86	129	1,560	1.35	106
Tennessee	31	13	10.2	22.3	21	21	125	103	1,560	1.19	102
West Virginia	33	14	16.8	23.3	28	28	74	34	1,560	1.47	100
Kentucky	37	10.5	18.4	29.9	33.6	33.6	68	90	793	1.18	92
Ohio	37	10.5	13	29.2	26.6	26.6	97	97	671	1.17	102
Michigan	37	20.3	17.5	32.3	27	27	113	88	840	1.22	102
Illinois	37	18.7	18	32	27	27	88	88	840	1.21	114
Indiana	37	12.6	15	32	27	27	102	108	650	1.21	119
Wisconsin	39	12.3	22	35	30	30	138	81	1,033	1.47	97
Minnesota	35	10.2	15.6	30	22.3	22.3	86	81	1,033	1.37	123
Iowa	40	14	17	30	27.3	27.3	91	99	663	1.60	110
Missouri	40	11	20	25	18.1	18.1	80	118	663	1.07	128
Kansas	33	11	20	25	20	20	81	87	663	1.63	104
Nebraska	45	23.1	16.4	32	30.7	30.7	81	87	663	1.63	103
Colorado	23.1	11.3	40	30.7	30.7	30.7	107	208	663	1.63	103
California	28	14	17.7	33	33	33	107	208	663	1.63	103
Oregon	32	16	22	30	30	30	123	123	663	2.10	.....
Nevada and the Territories	30	22	36.3	30	30	30	120	120	663	1.28	.....

DEPARTMENT OF AGRICULTURE.
SPECIAL REPORT—No. 20.

REPORT

UPON THE

CONDITION OF CROPS

DECEMBER 1, 1879.



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1879.

DECEMBER CROP REPORT.

WHEAT.

The yield of wheat as returned to us by our correspondents in November indicated an average yield for the whole country of 13.7 bushels per acre. This yield is almost identical with the average of 1877, and only slightly more than 1878.

The acreage in this cereal was increased about $1\frac{1}{2}$ per cent., and was estimated at 32,545,900 acres for this year, giving a total crop of 448,755,000 bushels against 420,122,400 in 1878.

Estimating the population at 48 $\frac{1}{2}$ million persons, the yield per capita is 9.2+ bushels. Allowing 5.5 bushels for home use, there would remain 3.7 bushels surplus, which would give 179,450,000 bushels for export.

The price this year as returned December 1 by the producer is \$1.11, making a total value of \$499,008,803, against a total value in 1878 of \$326,346,000 at the same date. It must be remembered that these are the average prices as returned by the farmers of the whole country, and not the prices in the great markets.

Table of wheat crop and value since 1870.

Years.	Acreage.	Yield per acre.	Total product.	Price per bushel.	Total value of product.	Wheat and flour exported in the fiscal year closing June 30 following.
						<i>Bushels.</i>
1870	18,992,591	12.4	235,884,700	\$1.04.2	\$243,865,045	52,374,111
1871	19,943,893	11.5	230,722,400	1.25.8	290,411,820	38,995,755
1872	20,858,359	11.9	249,967,100	1.24	310,180,375	52,014,715
1873	22,171,676	12.7	281,254,700	1.15	323,594,805	91,510,398
1874	24,967,027	12.3	308,102,700	0.94.1	291,107,895	72,912,817
1875	26,381,512	11.0	292,136,000	1.00	294,580,990	74,750,682
1876	27,627,021	10.4	289,350,500	1.03.7	300,259,300	57,149,949
1877	26,277,546	13.9	364,194,146	1.08.2	394,695,779	92,141,626
1878	32,108,560	13.1	420,122,400	0.77.7	326,346,424	150,502,506
1879	32,545,899	13.7	448,755,118	1.11	499,008,803	.....

WINTER WHEAT.

Our preliminary investigation points to an increase of 12 per cent. in the area sown in winter wheat. The only States reporting a decline are Alabama, Mississippi, and Arkansas, in which the winter wheat area would not exceed that of some counties of the Northwest. All the other States show an increase, especially the spring-wheat States of the Northwest. The winter-wheat acreage of these States, however, is small, and hence their increase, even a very high ratio, does not add materially to the breadth sown in the country. But many large winter-wheat States report great enlargement—New York, West Virginia, Ohio, and Michigan, each 7 per cent.; Texas and Tennessee, each 10 per cent.; Kentucky and Indiana each 14 per cent.; Missouri, 16 per cent.; Kansas and Oregon each 20 per cent.; Illinois, 22 per cent.

There are quite general complaints of the ravages of the Hessian fly in early-sown crops, and of drought hindering germination in the later sown. Yet the crop starts out, on the whole, under prospects considerably above average, especially in the large winter-wheat States.

The following extracts from correspondence are given.

MAINE.—*Aroostook*: But little sown; spring wheat is our principal crop. *Penobscot*: Very little raised.

VERMONT.—*Orleans*: Acreage slightly increased.

NEW YORK.—*Allegany*: Condition not so good as usual. *Chautauqua*: Acreage increased 25 per cent.; prospects diminished by warm, dry weather and the Hessian fly; "Clawson" the most affected. *Genesee*: Very large growth; some fields 2 feet high; an open winter is desirable. *Niagara*: More uniformly good than for many years. *Saint Lawrence*: The largest area ever sown; some fields damaged by drought and early frosts.

NEW JERSEY.—*Hunterdon*: Prospects lowered by drought. *Morris*: Conditions never more promising. *Salem*: Usual acreage. *Burlington*: The dry fall has retarded germination and growth. *Warren*: Thirty per cent. larger acreage; outlook very promising.

PENNSYLVANIA.—*Sullivan*: Very poor condition; drought. *York*: Condition strong and healthy. *Armstrong*: Better prospects than last fall. *Beaver*: Early sown; very favorable. *Monroe*: Never better. *Northampton*: Better prospects than last year, but many fields affected by the fly. *Northumberland*: Best condition known for years. *Westmoreland*: Luxuriant. *Centre*: Drought still continues; the crop will suffer if winter sets in without copious rains. *Indiana*: Good prospects. *Greene*: Too dry for anything to grow.

MARYLAND.—*Baltimore*: Early sown, badly affected with the Hessian fly. *Caroline*: Very bad condition. *Montgomery*: Very unfavorable. *Calvert*: Small growth; drought. *Cecil*: Late sown injured by drought. *Frederick*: Injured by drought and ravaged by the Hessian fly.

VIRGINIA.—*King George*: Very poor; drought. *Prince William*: Poor; some fields destroyed by the Hessian fly. *Warwick*: Continued warm and dry weather has injured it. *Hanover*: Very unsatisfactory; drought. *Pittsylvania*: Outlook discouraging; unusually dry fall. *Richmond*: Not looking as well as could be desired. *Rappahannock*: Poor; drought. *Mecklenburg*: But little sown, owing to the drought. *James City*: Exceedingly bad. *Greenville*: Continued drought. *Green*: Promising. *Fauquier*: Reduced to below average condition by drought and the fly. *Palmer*: Bad condition; but little of the early sown germinated; drought. *Culpeper*: Late sown not yet germinated; early sown injured by the fly. *Orange*: Poor prospects; drought; early-sown fields infested by fly. *King William*: Late sown did not germinate; early-sown injured by the fly. *Craig*: Great damage by the Hessian fly and drought. *Dinwiddie*: Increased acreage; cold, dry weather has seriously affected the growth. *Gloucester*: Fields sown one month ago have not yet germinated. *Middlesex*: Increase in acreage; condition below average. *Rockingham*: Early sown badly injured by the fly. *Halifax*: Ground too dry to sprout late-sown grain; stand generally thin. *Chesterfield*: Badly injured by the drought. *Amelia*: Late sown ungerminated; drought; early sown injured by the Hessian fly, and some fields plowed up. *Goochland*: Bad condition; drought.

NORTH CAROLINA.—*Iredell*: Increased acreage. *Buncombe*: Just coming up. *Forsyth*: Little sown; extreme dry weather. *Pasquotank*: Largely increased acreage; condition very backward. *Halifax*: Drought makes germination slow. *Nash*: Increased acreage. *Pender*: No rain up to December 1. *Cleveland*: Fine condition.

SOUTH CAROLINA.—*Lexington*: Early sown looks well.

GEORGIA.—*Fannin*: Large breadth sown; just coming up. *Polk*: Owing to the high price of seed, very little will be sown. *Warren*: Increased acreage. *Worth*: Favorable. *Terrell*: Increased acreage. *Talbot*: Acreage increased. *Jefferson*: Favorable fall; acreage increased. *De Kalb*: Sowing much delayed on account of the late cotton season. *Gordon*: Sowing not finished.

ALABAMA.—*Clay*: Sowing much later than usual; weather very favorable.

MISSISSIPPI.—*Choctaw*: Favorable fall; grain germinating finely. *Yazoo*: Less acreage than last year, owing to the emigration to Kansas.

TEXAS.—*Gillespie*: Small acreage; drought. *Lampasas*: Gloomy prospects. *Guadalupe*: Too dry for seed to germinate. *Comanche*: Ground too dry for any winter crop. *Dallas*: Late rains; crop more promising. *McLennan*: Ground too dry to germinate the seed; many farmers have resown their fields. *Williamson*: Small acreage; little rain for six months. *Burnett*: None sown; ground too dry for plowing. *Bandera*: Seeding prevented by drought. *Rockwall*: Recent showers have caused the grain to sprout. *Hays*: No grain sown; ground could not be plowed. *Austin*: Drought retards the sowing of small grain. *Bastrop*: None sown; ground too dry for

plowing. *Bezar*: None sown; drought. *Grimes*: Drought still prevails. *Madison*: Little sown; drought.

ARKANSAS.—*Pope*: Small acreage. *Van Buren*: Drought reduced the acreage. *White*: Weather too dry for sowing. *Clark*: Seeding unfinished. *Montgomery*: Seeding is progressing. *Johnson*: Better than usual. *Marion*: Small acreage; severe drought; the little that is up looks very poor.

TENNESSEE.—*Williamson*: Better prospects than for years. *Lawrence*: Area increased about one-eighth. *Rutherford*: Smaller acreage than last year. *Sumner*: Splendid condition; acreage increased 33 per cent. *Loudon*: Seeding was considerably retarded by drought; prospects are now improving. *Henry*: Early sown injured by the fly, but the stand is still good. *Hamblin*: Probably the largest area ever sown in this county. *Henderson*: Seeding delayed by cotton picking; early sown looks flattering. *Davidson*: Some complaint of the fly in early sown, but the crop generally is looking well. *Franklin*: Prospects improved. *Gibson*: Acreage a little decreased. *Marshall*: Very fine condition.

WEST VIRGINIA.—*Berkeley*: One-third did not sprout; what came up has grown but little; drought since September 15. *Calhoun*: Large acreage but suffering for rain. *Hardy*: Much of it not sprouted; drought. *Kanawha*: Needs rain. *Marshall*: Looking badly; dry fall. *Mercer*: Did not root well; drought. *Morgan*: Some not up, owing to protracted drought; early sown destroyed by Hessian fly. *Pleasants*: Early sown injured by the fly. *Putnam*: Seriously injured by drought and the fly. *Ritchie*: Fall too dry; did not get a good start. *Randolph*: Looks bad owing to dry weather; improving since rain. *Summers*: Very promising. *Wetzel*: Largest area ever sown, but on account of dry weather it does not look well; early sown fields injured by the fly. *Jackson*: Dry fall; crop has grown but little. *Mason*: Early sown badly damaged by the fly; some fields resown; very dry fall. *Allen*: Favorable fall; crop looks well. *Taylor*: Increased acreage. *Wayne*: Prospects not so good as at this time last year; drought and early frosts. *Roane*: Did not come up well; drought.

KENTUCKY.—*Anderson*: About as usual. *Bourbon*: Suffering for rain; the Hessian fly injured early sown fields. *Barren*: Crop put in with more than usual care. *Carroll*: Badly injured by the Hessian fly. *Fayette*: Nearly all early sown greatly injured, if not entirely ruined, by the fly; late sown fields look promising; largest acreage ever sown in this county. *Garrard*: Acreage in excess of last year; condition vastly below average; dry weather. *Lee*: Large acreage. *Logan*: Acreage decreased; more attention given to clover and meadows. *Laurel*: Early sown looks very fine. *Lyon*: Some fields injured by the fly. *McCracken*: Complaint of the fly in early sown fields. *McLean*: Promising; some complaint of Hessian fly in early sown. *Nelson*: Retarded by drought. *Nicholas*: Large increase in acreage; continued dry weather causes it to look poor; early sown badly injured by the fly. *Russell*: Acreage increased one-third; much of it late, and complaint of the fly in many localities. *Scott*: Materially injured by drought, and some damage by the fly. *Shelby*: Much affected by drought; lower leaves destroyed by a small winged insect; fears are entertained of injury next spring by the Hessian fly. *Woodford*: Some complaint of the fly. *Fleming*: Looks poor; drought and injury by the Hessian fly. *Jessamine*: Late sown very backward; early sown injured by the fly. *Bracken*: Early sown badly damaged by drought and the fly, and will not make a half crop; late sown looks well but is small. *Union*: Fine, strong, and healthy growth. *Jefferson*: Great injury by the fly. *Mason*: Injured by drought and the fly. *Washington*: Not looking well; dry fall. *Fulton*: Very fine. *Todd*: Some complaint of the fly. *Owsley*: Acreage increased; looks better since the frost killed the fly and grasshopper.

OHIO.—*Allen*: Heavy increase in acreage, and mostly drilled in; condition excellent. *Ashland*: "Booming." *Athens*: Very backward; drought. *Adams*: Large acreage and well put in; considerable damage by the fly and rust. *Fairfield*: Acreage increased. *Grange*: Largest acreage ever sown and well put in; condition above average. *Logan*: Injured by a worm (new to this locality), giving it the appearance of having been ravished by the fly; since recent rains it has rested and now looks well. *Lorain*: Complaint of rust in some early sown fields. *Licking*: Large increase in acreage. *Meigs*: Too dry; complaint of the fly. *Marion*: Badly injured by drought and rust. *Medina*: Increased acreage and fine condition. *Preble*: Badly rusted in October, but now looking better. *Portage*: The complaints of injuries in September and October, by the fly, are now supposed to be the effects of the continued dry weather. *Perry*: Made a fair start; some early sown fields injured by the fly. *Sandusky*: Looks fine and prospects good. *Tuscarawas*: Increased acreage. *Union*: Suffered by drought and the fly; recent warm rains brought it up to average condition. *Vinton*: Injured badly by drought and the fly. *Williams*: Splendid condition; a few fields affected with wire worm. *Guernsey*: Injured by drought; early sown looks best. *Hardin*: Improved since rain. *Mercer*: Some complaint of fly, but still promises well. *Clark*: Looking well. *Scioto*: Much of early sown destroyed by the Hessian fly.

MICHIGAN.—*Allegan*: Extraordinary growth; some insects. *Gratiot*: Some com-

plaint of the fly. *Jackson*: Large acreage and unprecedented growth. *Tuscola*: Weather very unfavorable during November. *Eaton*: Large acreage; heavy growth, but infected with insects. *Oakland*: Finest growth for many years.

INDIANA.—*Franklin*: Injured by dry weather; improved since rain. *Decatur*: Large acreage; injured by drought and the fly. *Greene*: Largest acreage ever sown; condition good. *Howard*: Heavy increase in acreage; condition could not be improved. *Marion*: Very rank growth. *Shelby*: Recent rains improved it very much. *Switzerland*: Sad havoc by the fly and drought; prospects lowered 20 per cent. *Tip-ton*: Has a fine start for winter. *Tippecanoe*: In the Wabash Valley the acreage is increased 33 per cent.; condition excellent. *Warick*: Acreage largely increased. *Whitley*: Looks well. *Orange*: Fine condition. *Pike*: Early sown damaged by the fly. *Warren*: Looking fine and promises a large crop. *Miami*: Largest acreage ever sown; condition excellent. *Starke*: Heavy increase in acreage. *Wabash*: Never more promising; acreage increased.

ILLINOIS.—*Coles*: Large increase in acreage; some damage by the fly in early sown fields. *De Kalb*: Not in usual condition, owing to drought. *Edgar*: Improved by late rains. *Greene*: Acreage increased one-fourth; late rains improved the prospect. *Hancock*: Double last year's acreage and much improved by recent rains. *Johnson*: Some injury by fly; looks better since cool weather. *Kendall*: Dry fall prevented early sowing. *Kankakee*: Increased acreage. *Livingston*: Largest acreage for several years; some complaint of the fly, but generally looks well. *Logan*: Looking well but needs rain. *Lawrence*: Some fields injured by the Hessian fly. *Montgomery*: "Every spare foot is in wheat." *Mason*: Large increase in acreage. *Morgan*: Plenty of rain; condition good. *Moultrie*: Injured by the fly in some sections. *Pratt*: Largest acreage ever sown; could not look better. *Perry*: Early sown injured by the fly; second sowing looks fine. *Putnam*: Farmers using the "Odessa" for fall sowing, as it yields almost double any other variety. *Shelby*: "Fultz" all the rage here; department highly complimented for the distribution of this variety. *Tazewell*: Best possible condition. *Winnebago*: Heavy increase in acreage, but not looking well; drought. *Union*: Some complaint of the Hessian fly.

WISCONSIN.—*Columbia*: Four acres sown this fall to one last year. *La Fayette*: Good condition for winter. *Portage*: Spring wheat our principal crop; winter wheat has done well the past two years and a large acreage sown this fall. *Rock*: Now generally sown; largely increased acreage. *Milwaukee*: Heavy growth.

MINNESOTA.—*Fillmore*: Hundreds of acres sown and is looking well; have never had a variety that would not winter kill. *Goodhue*: Experiments with winter cereals have proven so unremunerative that farmers have discontinued them. *Rock*: Double the usual acreage. *Steele*: Many farmers have sown a small area as an experiment. "A new variety of spring wheat with all the virtues of the original 'Pife,' is needed here." *Lac-qui-parle*: All dead. *Le Seuer*: Limited acreage, but looks well.

IOWA.—*Clinton*: Very backward on account of drought; some complaint of the fly. *Davis*: Early sown some damaged by the fly; late sown not hurt. *Greene*: A few pieces sown as an experiment. *Howard*: Fears are entertained of an open winter, which would be disastrous to the crop. *Jasper*: Acreage largely increased; stands the winter better as the land becomes older. *Lee*: Poor condition; drought and Hessian fly. *Marion*: Heavy acreage and booming. *Muscatine*: Increased acreage and good prospect. Fine weather, farmers in good cheer, and prices on the boom. *Ringgold*: Largest acreage ever sown; condition the very best. *Victor*: Three times the usual acreage; "Odessa" now sown for winter wheat. *Tama*: Large acreage; a new industry for this country. *Mitchell*: Extensively sown and looks well.

MISSOURI.—*Audrain*: Injured by drought. *Christian*: Going into winter quarters in very best condition. *Callaway*: Increased acreage and looking well. *Crawford*: Damaged by rust and the Hessian fly; some improvement since cool weather. *Gentry*: Looks well. *Gasconade*: Slightly damaged by the Hessian fly. *Johnson*: Acreage increased 20 per cent. *Lincoln*: Eggs of the fly are in nearly all of the fields; fine November rains brought the crop up beyond expectations. *Marion*: Late rains improved it. *Pulaski*: Doing finely. *Platte*: Looking well. *Saint Charles*: Much damage by the Hessian fly; some fields sown a second time. *Vernon*: More or less fly and chinch-bugs; prospects discouraging. *Washington*: Some fields of early sown about killed by the Hessian fly; Russian amber from department is looking well. *Perry*: Some complaint of damage by the Hessian fly. *Saint Genevieve*: Extraordinary growth and increased acreage. *Sullivan*: Some fields so badly injured by the fly that they were resown. *Worth*: Doing well. *Caldwell*: Very fine. *Dallas*: Rather small, owing to dry fall; but condition is good. *Pemiscot*: Very favorable fall; business of all kinds improving.

KANSAS.—*Decatur*: Large increase in acreage; county filling up rapidly. *Davis*: Condition could not be better. *Doniphan*: Damaged badly by the Hessian fly; late sown looks well. *Dickinson*: Never looked better. *Harvey*: Very fine. *Logan*: Favorable fall. *Lincoln*: Looks remarkably well; weather so nice you can almost see it growing. *Leavenworth*: Large increase in acreage; best prospects for years. *Meads*:

Looks badly. *Montgomery*: Acreage largely increased; never saw it look better. *Pottawattomie*: Condition never better. *Woodson*: Acreage increased 10 per cent., and crop never more promising. *Ellis*: Increased acreage. *Marion*: Splendid condition. *Ness*: But little of it up; very dry fall. *Graham*: Very heavy increase in acreage. *Kingman*: Prospect never better. *Keno*: Splendid. *Saline*: Promising. *Stafford*: Best prospects for years. *Trego*: Needs rain. *Chase*: Could not look better.

NEBRASKA.—*Kearney*: Crop mostly spring sowing. *Sarpy*: What little there was sown looks well. *Gage*: Looking well. *Seward*: But little sown, owing to last year's failure. *Boone*: But little rain since August 20; ground poorly prepared, and farmers feeling uneasy as to next year's crop. *Lancaster*: Good condition.

CALIFORNIA.—*Inyo*: Crop generally sown in spring, but we are now experimenting with fall sowing. *Solano*: Properly speaking, we have no winter wheat. *Plumas*: Winter wheat not more than 6 per cent. of the crop. *San Bernardino*: Sowing just commenced. *Stanislaus*: A good rainy season will give the largest crop the country ever produced. *Yuba*: No distinction made here between winter and spring wheat. *Placer*: Acreage increased 50 per cent.

OREGON.—*Yam Hill*: Spring wheat badly injured by rust; very little of the crop is marketable. *Multnomah*: But little sown. *Marion*: Heavy increase in acreage owing to spring wheat rusting so badly. *Linn*: Increased acreage and looking well. *Polk*: Fair condition.

COLORADO.—*Larimer*: No attention given to winter wheat. *Pueblo*: No winter grain sown. *Douglas*: Dry weather prevented it sprouting.

UTAH.—*Box Elder*: Increased acreage and looks well. *Wasatch*: Very small acreage; last year's planting destroyed by grasshoppers and frosts. *Weber*: Just coming up; dry fall.

INDIAN TERRITORY.—*Cherokee*: Never better; good rains.

WASHINGTON TERRITORY.—*San Juan*: Small acreage and backward; too much wet weather.

CORN.

Our December returns somewhat reduce the yield of the corn crop in the great corn-producing States north of the Ohio River and in Missouri. In this region many counties reported an imperfect ripening of the crop, and unfavorable conditions during November. The result was a softening of the grain, rendering much of it unmerchantable, and some of it unfit for any sort of even domestic use. Some of these States reduce their estimates as much as 10 per cent. This will make the average yield per acre of the whole country 29.1 bushels, against 26.9 bushels in 1878. This average was exceeded in only one previous year—1875—when it was 29.4 bushels. The aggregate product of the country will therefore fall short of our November estimates about 55,000,000 bushels, but it will still exceed that of any former year by at least 150,000,000 bushels. The Eastern, Southern, and Pacific States show a greater or less decline, but the States north of the Ohio River and the States and Territories west of the Mississippi show an increase of over 160,000,000 bushels.

The average price of the crop obtained by the farmers was 37.6 cents per bushel, against 31.8 cents in 1878, an increase of over 18 per cent. The increase is general in all sections of the country; the only States showing a decline are Mississippi, 2 cents; Tennessee, 3 cents; Kentucky, 3 cents; Minnesota, 2 cents; and Missouri, 1 cent. The aggregate value of the crop of the country is nearly \$600,000,000, or one-third more than the crop of 1878.

The following notes are given:

MAINE.—*Piscataquis*: Very poor; early and severe frosts. *Waldo*: Owing to the cool season there is only an average yield.

VERMONT.—*Orleans*: Poor average; ears soft and imperfect. *Rutland*: Considerably injured by drought.

RHODE ISLAND.—*Washington*: Considerably injured by storms in early part of the season.

NEW YORK.—*Schenectady*: Very fine crop and harvested in good condition.

NEW JERSEY.—*Burlington*: Large yield; housed in good condition. *Hunterdon*:

Much injury by storms, but still an average crop. *Warren*: Increased acreage; some injury by storms.

PENNSYLVANIA.—*Beaver*: Soft and green. *Montgomery*: Some injury by drought, but still the crop will equal that of 1878. *Northampton*: Smaller yield, but better quality than last year. *Sullivan*: Shortened by the cold spring.

MARYLAND.—*Baltimore*: Anticipated a much larger yield than last year, but drought shortened it. *Caroline*: Good. *Howard*: Drought shortened the yield. *Montgomery*: Average.

VIRGINIA.—*Bedford*: Less than expected; drought. *Carroll*: Not so good as expected. *Dinwiddie*: Yield much reduced by drought. *Gloucester*: Shortened by spring drought. *Halifax*: Cut short by severe drought. *Chesterfield*: Housed in excellent condition. *Middlesex*: Half crop; drought. *James City*: Yield reduced by July drought and August storms. *Nansemond*: Drought and storms reduced the yield. *Warwick*: Injured by July drought and a cyclone in August.

NORTH CAROLINA.—*Iredell*: Housed in fine condition. *Forsyth*: Best crop for many years. *Person*: Drought. *Pasquotank*: Improved yield and quality. *Nash*: Drought. *Wilson*: Cribbed in excellent condition. *Macon*: Larger yield than last year. *Perquimans*: Almost a failure; a little better than last year. *Haywood*: Average yield, but poor quality.

SOUTH CAROLINA.—*Lexington*: Below average.

GEORGIA.—*Catoosa*: Cut short by excessive drought. *Forsyth*: Average crop. *Jasper*: Almost a failure. *Towns*: Housed in good condition.

FLORIDA.—*Madison*: Reduced by protracted drought. *Wakulla*: Injured by excessive rains.

ALABAMA.—*Clark*: Short on uplands. *Conecuh*: Largely increased acreage. *De Kalb*: Housed in good condition; yield beyond the most sanguine expectations.

MISSISSIPPI.—*Grenada*: Short. *Simpson*: Better result than expected in October. *Sumner*: Double last year's crop. *Tate*: Suffered by drought on uplands. *Yazoo*: Much better than was expected. *Choctaw*: Very good.

LOUISIANA.—*Franklin*: Average; some injury by drought.

TEXAS.—*Titus*: Below average; drought. *Dallas*: Not enough raised for home consumption. *Mason*: Total failure; importing it from Kansas. *Livingston*: All housed.

ARKANSAS.—*Marion*: Over average.

TENNESSEE.—*Decatur*: Average. *Bradley*: Housed in good condition. *Lawrence*: Not more than average. *Carroll*: None raised. *Lincoln*: Early planted, very poor. *Rutherford*: Below average; late planted done the best. *Hamblen*: Not so good as last year. *Gibson*: The damage done to the crop will about offset the increase in acreage.

WEST VIRGINIA.—*Doddridge*: Much better yield than was expected. *Kanawha*: Good yield on bottom lands. *Marshall*: Light weight. *Pleasants*: Crop injured by rot, grubworms, and drought; large quantity of nubbins and soft ears. *Summers*: Good yield on bottom lands; drought cut it short on uplands.

KENTUCKY.—*Anderson*: Spring drought prevented a full stand, which shortened the yield. *Barren*: Yield shortened by drought. *Carroll*: Did not fill well; much of it rotten. *Jessamine*: Much better yield than was expected. *Nelson*: Yield below expectations; rotting in shock and badly blown down. *Nicholas*: Good yield where a full stand was secured. *Russell*: About three-fourths of a crop. *Allen*: Light crop. *Jefferson*: Yield short and much of it unsound. *Washington*: Cribbed in good condition. *Fulton*: Damaged by storms, but still a good crop. *Todd*: Yield 15 per cent. better than was anticipated. *Henderson*: A large per cent. blown down and rotted. *Owsley*: Much better yield than was expected; some late planted taken by early frosts.

OHIO.—*Athens*: Inferior quality; some fields very light. *Adams*: Considerable of late planted mouldy. *Butler*: Expectations not realized; much of it blown down and not matured. *Geauga*: Many nubbins, which lowers the yield. *Knox*: A third below expectations. *Logan*: Much of it chaffy and poorly matured. *Licking*: Farmers disappointed both as to quality and quantity. *Morrow*: Fair yield, cribbed in good condition. *Meigs*: Husking out badly. *Preble*: Lighter yield than was expected. *Perry*: Light and chaffy. *Union*: Yield and quality below last year. *Lorain*: Lighter yield than was expected. *Hardin*: Increase in acreage will make product about the same as last year; quality not so good. *Mercer*: Injured by being blown down when maturing. *Scioto*: Quality fine, but yield considerably less than was anticipated.

MICHIGAN.—*Clinton*: Light crop; drought and frost. *Montcalm*: Lightest crop for many years. *Manistee*: Greatly injured by warm October weather. *Mason*: Very poor crop.

INDIANA.—*Carroll*: Considerably light and chaffy. *Dearborn*: A large per cent. not fit to keep, and a considerable portion not fit for any purpose. *Decatur*: Much of the crop was replanted, making it late; grain soft and chaffy. *Franklin*: Yield much below average; chaffy and rotten. *Knox*: Great falling off in yield; cold spring, dry summer, and high winds. *Hancock*: Light yield and generally poor quality. *Howard*: Late planted, destroyed by early frosts. *Marion*: Badly blown down, and much of it

soft and chaffy. *Parke*: Crop not so good as expected; much damage by wind; late planted did not mature. *Pike*: Injured by wet spring, drought, and storms. *Shelby*: Much lighter yield than was anticipated. *Warrick*: Considerable soft grain. *Whitley*: Late planted injured by early frosts. *Posey*: Finest crop ever produced in the county. *Bartholomew*: Not well matured; much of it soft and inferior. *Miami*: Not a half crop; early frosts. *Wabash*: Falls 25 per cent. below last year.

ILLINOIS.—*Boone*: Yield 20 per cent. less than was expected; drought and frost. *Coles*: Product not so large as was expected, but exceeds that of 1878. *Clark*: Not so good as last year on sandy soil; more than double the yield on clay lands. *Crawford*: Quality not so good as last year. *De Kalb*: More injury from frost than was at first supposed. *Edgar*: Yield not quite so good as was anticipated; some injury by frosts. *Greene*: Yield not up to expectations; quality good. *Kendall*: General complaint of light yield; replanted more or less soft. *Lee*: Largest acreage ever planted, and heaviest yield; product about 3,955,000 bushels. *Livingston*: Yield not so large as was anticipated a month ago, but quality good. *Montgomery*: Yield not so large as was anticipated. *Putnam*: Bulk appears larger than last year, but will not weigh out so well. *Tazewell*: Drought and frosts reduced yield 10 per cent.

WISCONSIN.—*Green Lake*: Drought shortened the crop. *Rock*: Average crop; damaged some on prairie lands by frost.

MINNESOTA.—*Martin*: Much lighter yield than was anticipated; early planted did the best. *Ramsey*: Acreage equals 1878, but yield per acre less. *Stearns*: Soundest crop ever raised.

IOWA.—*Cherokee*: Excellent quality. *Jackson*: Yield better than was expected. *Union*: Good yield, but not so heavy in weight as last year.

MISSOURI.—*Johnson*: Superb crop; weighs heavier than ever. *Platte*: Yield 10 per cent. below last year. *Perry*: Abundant crop; considerably damaged by being blown down. *Saint Charles*: Injured by drought. *Caldwell*: Some of it will be spoiled by wet weather before it can be husked.

KANSAS.—*Doniphan*: Yield not so good as expected. *Dickinson*: Nearly equal to last year on bottom lands; on uplands injured by drought and frost. *Ford*: "Egyptian Rice Corn" yields 100 bushels per acre; considered better than Indian corn, and is used for bread, also for cattle food. *Montgomery*: Increase in acreage will bring product up to average. *Ness*: Almost a failure; drought. *Woodson*: Better than last year, but still 5 per cent. below average. *Graham*: Very heavy increase in acreage.

NEBRASKA.—*Holt*: All crops injured by drought.

CALIFORNIA.—*Placer*: Yield increased 10 per cent. above last year's crop.

COLORADO.—*Larimer*: Short crop; drought.

UTAH.—*Beaver*: All crops short; scarcity of snow in mountains last winter caused a small supply of water for irrigation. *Davis*: All crops suffered by drought.

NEW MEXICO.—*Dona Ana*: Rio Grande River dried up and made all late crops a failure. *Taos*: All crops suffered by drought.

COTTON.

The returns made on December 1 constitute the final investigation of this department, through its correspondents. With the exception of that portion of the cotton belt lying west of the Mississippi River, the result of the investigation returned to the department November 1, regarding the "yield per acre," is substantially confirmed by the return December 1 of "total product as compared with last year." In Arkansas, Louisiana, and Texas the returns indicate an increase in product over that reported last month.

The weather has been favorable in all the States, and the late crop has been larger than was anticipated. In Texas the drought still continues, and the rains reported have not been general.

The following is a synopsis of the reports received December 1:

North Carolina, in 5 counties, reports an average product of 5 per cent. more than last year; in 22 counties an average of 25 per cent. less, and in 6 the same. South Carolina in 1 county reports an average of 20 per cent. more, 11 average 17 per cent. less, and 2 the same. Georgia: 12 report an average of 12 per cent. more, 32 report 20 per cent. less, and 9 the same as last year. Florida: None report more, 11 reported an average of 10 per cent. less, and 2 the same. Alabama: 1 reports 10 per cent. more, 15 average 16 per cent. less, and 8 the same. Mississippi:

14 average 20 per cent. more, 14 are 10 per cent. less, and 3 are the same. Louisiana: 4 report an average of 15 per cent. more, 4 report 10 per cent. less, and 1 the same. Texas: 9 counties report an average of 24 per cent. more, 35 counties report an average of 39 per cent. less, and 8 the same. Arkansas: 19 counties report 20 per cent. more, 6 an average of 16 per cent. less, and 5 the same. Tennessee: 9 report 15 per cent. more, 2 are 20 per cent. less, and 7 the same.

Basing the calculation on this latter estimate of "total product," we have a crop for this year of 5,020,387 bales of 450 pounds each. The price returned to us by the producer is an average of 10.2 cents per pound, which would give a total value in round numbers of 231 million dollars, against 194 millions in 1878.

The following extracts from correspondence are given:

NORTH CAROLINA.—*Iredell*: Nearly all gathered, and changed hands at reasonable prices; farmers are making preparations to plant more extensively next year. *Mecklenburg*: About three-fourths of a good crop; very little stained cotton. *Orange*: Quality unusually good. *Pasquotank*: Crop very inferior. *Rowan*: Less stained cotton than usual. *Nash*: Shortest crop since 1867. *Wilson*: Saved in fine condition. *Cumberland*: Favorable weather has increased the crop. *Perquimans*: Last year very poor, and this year but little better. *Pender*: Cotton all picked in good condition. *Stanly*: Crop much better than last year.

SOUTH CAROLINA.—*Union*: The staple is above average. *Fairfield*: All has been picked in fine condition. *Beaufort*: Sea Island crop reduced by devastations of caterpillars. *Oconee*: Rains caused cotton to take second growth, and the bolls thus formed were almost entirely destroyed by frost. *Lexington*: Very nearly equal that of last year, at a market value that will yield a larger profit than any crop for the past three years. *Georgetown*: Crop not all in, but short of expectations. *Laurens*: Fall exceptionally fine for picking.

GEORGIA.—*Thomas*: Almost a failure. *Forsyth*: Crop an average one; the increased price will enable farmers to pay their debts. *Warren*: Nearly all gathered. *Jasper*: Failed to mature; average will be about one bale to eight acres. *Lincoln*: Fully one-half of the late crop killed by frost; 70 per cent. of a full crop will not be realized. *Newton*: Late crop injured by frost. *Terrell*: Favorable fall has increased crop beyond expectations. *Clayton*: A heavy freeze killed all the late cotton. *De Kalb*: Has exceeded our most sanguine expectations; nearly all out and sold. *Gordon*: Yield beyond all expectations. *Rockdale*: Not up to the anticipated yield; making extensive preparations for next crop.

FLORIDA.—*Clay*: Injured by the long wet spell during fall months. *Columbia*: Season too wet for picking. *Marion*: All gathered, and crop below expectations. *Wakulla*: The ultimate result will show a larger crop than was anticipated and a marked improvement in quality. *Suwannee*: Long staple or sea island grown almost exclusively.

ALABAMA.—*Autauga*: Ten per cent. better than last year. *Clarke*: Has done better than was anticipated. *Henry*: Yield 15 per cent. greater than was estimated in November. *Barbour*: The late bolls left by the caterpillars have all opened and most of the staple has been housed. *Bullock*: Favorable circumstances have added somewhat to the aggregate of the crop. *Chambers*: Weather favorable and crop all picked. *Coffee*: Yielded better than was anticipated, owing to late frost. *Conceh*: Gathered, and yield fair. *De Kalb*: Fall favorable; crop nearly all picked, and prices remunerative. *Crenshaw*: Matured to a late date and turning out better than expected. *Franklin*: Fall unusually favorable; most of the crop now out of the fields. *Perry*: The crop has been disposed of more generally than I ever knew it at this date.

MISSISSIPPI.—*Grenada*: The greater portion of the crop picked earlier than usual and generally in a very good condition. *Anite*: Will be an average crop. *Marshall*: Unprecedented good weather has increased the crop, and its quality is perhaps better than in any former year. *Simpson*: Percentage increased by good weather. *Yalabusha*: About 90 per cent. of the crop has been gathered; the crop will be an average; lint turned out well from the seed; quality excellent. *Yazoo*: Season favorable for picking. *Sumner*: Crop pretty much all picked and yield about double that of 1878. *Prentiss*: Favorable weather has advanced the yield; there is much in the field yet, but of inferior grade. *Choctaw*: Very good, and producers paying their debts. *Lafayette*: The mild late fall has increased the yield; housed in fine condition. *Bolivar*: Weather good; 95 per cent. of crop picked in fine condition.

LOUISIANA.—*Richland*: Excelled last year's crop; the great bulk of the crop has been gathered. *Franklin*: Above average in some sections of the parish, in others below. *Concordia*: The late fall has been very advantageous and increased the estimates of crops.

TEXAS.—*Raines*: We are now suffering from the most severe drought ever known; crop nearly all gathered. *Trinity*: Picking still continues; late rains have made a new top growth of small bolls. *Anderson*: Very light crop of top cotton and opening slowly. *Dallas*: Yield fair, considering the unprecedented drought; picking over, and crop free from trash and stains. *Medina*: Crop fair. *Titus*: Yield at least 25 per cent. better than last year; lint long and fiber fine. *Collin*: About all gathered; saved in unexceptionable condition. *Polk*: Gathered and half marketed. *Uphur*: Better than expected in yield and quality. *Nacarro*: About all in; prices have advanced, owing to smallness of crop. *Ashley*: The dry fall has increased the yield at least 10 per cent. *Austin*: Turned out better than expected; the deficiency of the hay crop will be made up by feeding stock on cotton seed. *Bastrop*: The fall or top crop one of the finest ever raised; the crop below average yield, which will be counterbalanced by increase in price. *Stephens*: Has proven the best of all crops this year. *Waller*: Above former calculations. *Grimes*: Drought still prevails. *Harrison*: All gathered and in good condition. *Madison*: Turned out better than was expected; the best second or fall crop made for years. *Nacogdoches*: Crop light.

ARKANSAS.—*Lonoke*: Damaged by recent rains; at least three-fourths of crop has been put on the market. *Clark*: Best crop for several years. *Johnson*: Better than usual in yield and quality. *Marion*: Better than I ever saw it; average 1,000 pounds seed cotton to the acre on bottom lands. *Pulaski*: About seven-eighths gathered and two-thirds marketed.

TENNESSEE.—*Decatur*: A large crop, the best for years. *Williamson*: Owing to a late fall the crop is above average. *Bedford*: Better than expected. *Lawrence*: Advance in price will make up for deficiency of crop caused by drought. *Bedford*: Above the November estimate. *Fayette*: Very good and fall favorable. *Haywood*: Best crop ever known and season fine. *Lincoln*: Best for years.

TOBACCO.

Final returns have not sensibly changed our November estimate of this crop. The total product of the country is within a small percentage of that of 1878; the gain being chiefly in Kentucky, Tennessee, and Connecticut, and the most serious loss in Ohio and Missouri. As a whole, the quality is but slightly better than that of last year's crop, although the improvement is quite marked in several States. It is to be regretted that the price on the farm remains about the same as last year; that it has not kept pace with the improved prices in both wheat and cotton. For the present unprofitable average price there seems to be but one remedy—more attention to the cultivation and after-management of the crop.

We estimate the total crop of 1879 at 384,059,659 pounds, valued at \$21,545,591, against 392,546,700 pounds, valued at \$22,137,428 in 1878.

OATS.

The return of this crop made on November 1 is confirmed by the report of this month. The total product of the country is estimated at 364,253,000 bushels for this year, against a total in 1878 of 413,578,000 bushels; a decline of 12 per cent.

The price as returned on the 1st of this month averaged 33.2 cents per bushel, against 24.6 last year at the same time, making a total valuation this year of \$120,855,000, against \$101,945,000 in 1878.

The following consolidation of local estimates for the last five years presents a clear view of the relation of prices to production:

Years.	Acres.	Yield.	Bushels.	Average value.	Total value.
1875	11,913,075	29.7+	354,317,500	\$0.36.5+	\$129,499,930
1876	13,358,908	24.0+	320,844,000	0.35.1+	112,865,900
1877	12,826,148	31.6	406,394,000	0.29.2	118,661,550
1878	13,176,500	31.4	413,578,560	0.24.6+	101,945,830
1879	12,683,490	28.7	364,253,180	0.33.2	120,855,000

POTATOES.

The returns of December 1 make no change in the estimate of last month. With an increase of 3 per cent. in the acreage for this year we have a yield of 98 bushels per acre, against 69 bushels last year, and 94 bushels in 1877.

The total crop for the country is estimated at 181,369,000 bushels, which at the price returned, 43.5 cents, as the average, would make, in round numbers, \$79,000,000, against a valuation last year of \$73,050,000. Subjoined is given a table of product, price per bushel, and total value for the last five years:

Year.	Product.	Price per bushel.	Value.
1875	166,877,000	\$0.38.9	\$63,019,000
1876	124,800,000	65.5	81,660,000
1877	170,062,000	44.8	76,249,000
1878	124,027,000	58.8	73,050,000
1879	181,369,000	43.5	79,000,000

The following notes are appended:

MAINE.—*Aroostook*: Fine. *Oxford*: Good. *Cumberland*: Much injured by beetles and rot.

NEW HAMPSHIRE.—*Cheshire*: Good yield, but rotting badly. *Rockingham*: Very large.

VERMONT.—*Addison*: Good, but rotting. *Caledonia*: Good. *Windsor*: Rotted badly.

MASSACHUSETTS.—*Berkshire*: Fair supply, but badly rotted.

CONNECTICUT.—*New Haven*: Large, but badly rotted. *New London*: Rotted somewhat.

NEW YORK.—*Cattaraugus*: Large and of fine quality. *Westchester*: Good in quality. *Delaware*: One-fourth rotted. *Madison*: Drought injurious. *Saratoga*: Rotting badly. *Sullivan*: Large, but affected by rot. *Wayne*: Injured by bugs and rot.

NEW JERSEY.—*Morris*: Better than last year. *Middlesex*: Injured in quantity and quality by droughts.

PENNSYLVANIA.—*Beaver*: Good. *Berks*: Good; 100 bushels per acre. *Butler*: Early plantings bad, but late ones average. *Crawford*: Good. *Fayette*: Short, but good. *Lehigh*: Suffered by drought. *Lycoming*: Fine; in some places 300 bushels to the acre. *Sullivan*: Superior in quality and quantity. *Bucks*: Injured by dry hot weather. *Montgomery*: Above average. *Luzerne*: Average.

DELAWARE.—*Kent*: Short from drought.

MARYLAND.—*Montgomery*: Good. *Queen Anne*: Good. *Talbot*: Injured by rain and storm.

VIRGINIA.—*Bedford*: Gathered in good condition. *Dinwiddie*: Short from drought, but of good quality. *Henrico*: Very light; long drought; *Highland*: Cut short; drought. *Rappahannock*: Suffered from drought. *Richmond*: Shortened by drought. *Rockingham*: Cut off by drought. *Prince George*: Good, but partly destroyed by droughts and insects.

NORTH CAROLINA.—*Columbus*: Good. *Gaston*: Cut short by drought. *Greene*: Average. *Harnett*: Damaged by drought. *Jackson*: Good, but partly destroyed by drought. *Haywood*: Slightly injured by drought.

SOUTH CAROLINA.—*Barnwell*: Good. *Newberry*: Very little cultivated, and not good. *Lerington*: Average; equal to last year.

GEORGIA.—*Baker*: As large as last year. *Jackson*: Small, and damaged by weather. *Murray*: Spring drought destructive. *Clayton*: Very poor. *Pulaski*: Killed by frost. *Talbot*: Not yet gathered.

FLORIDA.—*Leon*: Short, from too much rain. *Suwannee*: Fair. *Marion*: Much injured by rain.

ALABAMA.—*Autauga*: Good. *Calhoun*: Full yield.

MISSISSIPPI.—*Greene*: Very large. *De Soto*: Fine. *Holmes*: Yield very light. *Choctaw*: Good.

TEXAS.—*Burleson*: A failure. *Karnes*: Failure on account of drought. *Lamar*: A failure; drought. *Mason*: A failure. *Titus*: Early crop fine; late injured by

drought. *Victoria*: Yield small but sound. *Burnett*: Failure. *Austin*: Yield poor; drought. *Collin*: Short from drought. *Jasper*: Yield of early plantings very good. ARKANSAS.—*Fulton*: Not as good as last year. *Marion*: Small but good. *Prairie*: Complete failure. *Van Buren*: Potatoe bug destructive. *Johnson*: Copious rains in September and October; good yield. *Franklin*: Good in quality and quantity.

TENNESSEE.—*Anderson*: Moderate. *Lawrence*: Injured by weather. *Shelby*: Good. WEST VIRGINIA.—*Braxton*: Above average. *Doddridge*: Late planted did well; early plantings a failure. *Jackson*: Late planting, good. *Morgan*: Largest for years. *Marshall*: Light yield and small in size. *Roane*: Late varieties good.

KENTUCKY.—*Clinton*: Short. *Kenton*: Peach Blows did well. *Nicholas*: Light yield and small in size. *Woodford*: Half crop. *Union*: Average.

OHIO.—*Allen*: "Beauty of Hebron" from the department an exceptionally fine variety. *Coshocton*: Injured in some localities by the beetle. *Geauga*: Best for 10 years. *Knox*: Yield under average but quality good. *Lorain*: Very short. *Preble*: Light yield but fair. *Trumbull*: Much better than last year. *Wayne*: Heavy. *Wyandot*: Good yield, late varieties rotting. *Sandusky*: Light. *Clermont*: Cut short by drought.

MICHIGAN.—*Clinton*: Below average. *Manistee*: Late planted fair. *Ottawa*: Yield greatly decreased by drought. *Saginaw*: Indifferent. *Tuscola*: Drought. *Bay*: Injured by drought and early frosts. *Cass*: Below average, but quality good. *Mason*: About half a crop. *Marquette*: Yield above average. *Shiawassee*: Light. *Wexford*: Failure in some localities.

INDIANA.—*Decatur*: Bugs took a portion. *Dearborn*: Injured by frost in some localities. *Jay*: Very good. *Franklin*: Short. *Warrick*: Late extra good. *Steuben*: Sound and good. *Jefferson*: Yield small but quality excellent. *Hamilton*: Rot. *Marion*: Light crop. *Madison*: Rotted badly.

ILLINOIS.—*Fayette*: Not so good as usual. *Hancock*: Drought lessened yield; quality good. *Kankakee*: Late crop light. *Piatt*: Damaged by bugs. *Lawrence*: Some rot. *Wabash*: Late planted good. *Sangamon*: Bugs and drought injurious. *Wayne*: Small size and very light yield. *Putnam*: Short; drought. *Shelby*: Late planted very poor. *Whiteaide*: Late almost a failure. *Greene*: Late a failure. *Perry*: Poor. *Carroll*: "Victor" from department is "victorious in yield and quality." *Ogle*: Good quality. *Coles*: Late yielded better than expected. *Marion*: Short. *Mo. gan*: Injured by drought and beetles. *Livingston*: Late varieties very short.

WISCONSIN.—*La Fayette*: Late plantings injured by drought and early frosts. *Rock*: Small but good. *Racine*: Frost lessened the yield. *Walworth*: Best for years. *Brown*: Indications of rot.

MINNESOTA.—*Kandiyoiki*: Better than usual. *Ramsey*: Extra. *Fillmore*: Good yield and quality. *Otter Tail*: Damaged by heavy storms. *Pope*: Good yield and quality. *Becker*: Best ever raised in county.

IOWA.—*Hardin*: Early plantings good; late varieties very light. *Lee*: Light crop. *Ringgold*: Average crop. *Greene*: Light yield. *Henry*: Late plantings very light. *Polk*: Fair yield. *Howard*: Mostly small; drought and bugs.

MISSOURI.—*Benton*: Drought. *Christian*: Sound. *Carler*: Best in ten years. *Cass*: Light, quality good. *Clark*: Very short. *Gentry*: Light. *Johnson*: Late varieties do not yield as expected. "Ruby," "Victor," and "Beauty of Hebron," from department, average 200 bushels per acre. *Lewis*: Almost a failure; bugs and drought. *Macon*: Light, but quality good. *Washington*: Never better. *Warren*: Early plantings good. *Holt*: Not so much rot as usual. *LaFayette*: Moderate early crop; late varieties a failure. *Wright*: Yield reduced by drought.

KANSAS.—*Doniphan*: Late crop fair. *Lyon*: Early crop average; late varieties nearly a failure. *Marion*: Few in hill and very small. *Reno*: Many fields not ten bushels per acre. *Jackson*: Drought. *Linn*: Early plantings did well; late varieties not so good. "Beauty of Hebron," leads the "Early Rose" in yield and quality. *Ellis*: Failure; "Beauty of Hebron" the leading variety. *Montgomery*: Good early crop; late varieties a partial failure.

NEBRASKA.—*Greeley*: Average, excellent quality. *Platte*: Acreage nearly double that of last year; yield not so good as expected. *Saunders*: Excellent, but short.

CALIFORNIA.—*Contra Costa*: Bountiful. *Humboldt*: Badly blighted; many fields not worth digging. *Solano*: Damaged by cold spring and hot summer. *Yuba*: Above average and superior. *Placer*: Largest for years.

OREGON.—*Multnomah*: Early plantings badly blighted. *Clackamas*: Excellent and good. *Cos*: Badly blighted and rotting.

COLORADO.—*El Paso*: Small, but best quality for years. *Larimer*: Raised in the mountains only; light for want of rain.

DAKOTA.—*Union*: Many fields destroyed by frosts and grasshoppers.

WASHINGTON TERRITORY.—*Clarke*: Unusually good. *Wahkiakum*: Our main crop; mostly grazing lands in this county. *San Juan*: Small and poor.

INDIAN TERRITORY.—*Choctaw*: Raised principally by the Indians.

WINTER RYE.

The area in winter rye has fallen off about 3 per cent. from last year. The New England States, the States north of the Ohio River, and the Pacific States equal or slightly enlarge their last years acreage; Texas, the only one of the Gulf States in which this crop is of sufficient importance to attract attention reports an increase of 19 per cent. The other sections report a diminished breadth; the falling off in the Southern inland States is fully one-fifth. The condition of the crop is about average, on the whole being above average in a majority of the States reporting it.

BUCKWHEAT.

The acreage in buckwheat reported to this department August 1, was 3 per cent. less than that of 1878, and gave an area of 640,210 acres in this crop. The yield per acre as reported on November 1, was an average of 20.5 bushels per acre, against 18.2 last year. Fully two-thirds of this crop is grown in the States of New York and Pennsylvania. Ohio, Michigan, and Wisconsin produce one-half of the balance. In the first two of these States and in all the New England States, the crop was somewhat above an average one, but in the three latter it was below.

The total product of the country is estimated 13,145,600 bushels, which at the average price returned by the producer, 59 + cents per bushel, would give \$7,860,000 in round numbers, as the value of the crop for this year against \$6,454,000 in 1878.

HAY.

The hay crop is about 10 per cent. less than that of 1878. The New England and Gulf States have slightly increased their product, but all other sections have declined. The heaviest loss is in the Southern inland States which, taken together, have fallen off 27 per cent. The drought in this section, has fallen with especial severity upon the grass crop. The same disastrous influence has been felt in the States north of the Ohio, where the loss is 20 per cent. and in the South Atlantic States where it amounts to 17 per cent. The Middle States, the largest hay producing region of the country, fall off 9 per cent.; in the remaining sections, the losses have been much less, the Pacific States falling off but 1 per cent.

The average price of hay is about \$9.24 per ton against \$7.21 in 1878. The aggregate value will be over \$325,000,000 against \$285,543,752 last year, an increase of nearly 14 per cent.

Average prices of farm crops December 1, 1879, and area and condition of winter grain.

States.	WHEAT.		OATS.		BARLEY.		BUCK- WHEAT.		POTATOES (Solanum tuberosum).		LEAF TOBACCO.		HAY.		SORGHUM MOLASSES.		WINTER WHEAT.		WINTER RYE.	
	Per bushel.	Per bushel.	Per bushel.	Per bushel.	Per bushel.	Per bushel.	Per bushel.	Per bushel.	Per bushel.	Per bushel.	Per pound.	Per pound.	Per pound.	Per gallon.	Per gallon.	Area sown compared with 1878.	Average con- dition De- cember 1.	Area sown compared with 1878.	Average con- dition De- cember 1.	
Maine.....	\$0 76	\$1 44	\$0 96	\$0 43	\$0 80	\$0 59		\$0 42						\$9 23				100	102	
New Hampshire.....	78	1 50	79	48	78	68		48						8 10			102	101	97	
Vermont.....	73	1 39	79	40	81	58		40						16 10			102	106	105	
Massachusetts.....	78	1 50	86	50	80	66		56						17 50			101	102	101	
Rhode Island.....	75			44				62						10 50			105	101	105	
Connecticut.....	74	1 50	88	43	68	76		53						9 75			100	100	105	
New York.....	61	1 40	75	40	72	64		36						8 75			100	107	101	
New Jersey.....	58	1 38	79	40		69		59						10 75			103	97	98	
Pennsylvania.....	54	1 32	80	36	83	60		37						12 83			97	98	98	
Delaware.....	55	1 38	1 15	35		75		60						14 56	\$0 44		105	99	97	
Maryland.....	52	1 42	80	40		71		60						14 56			105	88	94	
Virginia.....	49	1 27	63	38		62		56						12 40	45		104	87	93	
North Carolina.....	58	1 27	80	45	65	59		63						11 33	45		103	84	88	
South Carolina.....	75	1 57	1 22	68		98		60						10 25	11		102	96	95	
Georgia.....	70	1 26	1 24	57	1 28			48						14 96	10		102	101	100	
Florida.....	81			83				48						22 50	24		94	98	99	
Alabama.....	66	1 32	1 35	65				48						13 56	11		100	98	100	
Mississippi.....	62	1 36	1 02	61				49						14 83	10		99	110	100	
Louisiana.....	76			67				41						12 50	10		77	119	83	
Texas.....	1 03	1 15	1 00	62	96			41						11 04	10		77	119	88	
Arkansas.....	58	1 07	91	46				75						14 10	10		101	99	99	
Tennessee.....	37	1 09	71	35	74			57						10 45	35		103	99	97	
West Virginia.....	46	1 08	61	32		72		49						12 60	10		103	99	91	
Kentucky.....	37	1 08	73	36	81			73						11 26	61		87	96	91	
Ohio.....	39	1 20	69	30	70			60						12 38	36		94	98	93	
Michigan.....	45	1 17	64	35	73			43						10 65	48		99	97	99	
Illinois.....	34	1 07	71	28	78			41						12 56	48		106	96	104	
Indiana.....	34	1 07	61	27	59			75						9 84	41		104	100	99	
Wisconsin.....	31	1 07	61	27	59			92						12 38	40		103	107	101	
Minnesota.....	29	92	49	23	43			33						8 58	51		104	107	103	
Iowa.....	24	92	51	23	45			26						4 74	47		104	107	101	
Nebraska.....	25	1 01	61	26	47			32						4 54	48		105	96	95	
Missouri.....	27	80	51	26	43			91						4 01	33		104	92	99	
Kansas.....	27	80	51	26	43			88						9 43	43		116	104	101	
Colorado.....	31	84	85	23	37			83						4 01	49		120	98	111	
California.....	79	1 23	1 17	67	56			1 04						3 23	32		117	100	96	
Oregon.....	93							78						10 00	32		126	100	96	
The Territories.....	90	1 06	1 83	61	79			86						9 93	80		108	98	100	
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DEPARTMENT OF AGRICULTURE.
SPECIAL REPORT—No. 21.

REPORT

UPON THE

NUMBERS AND PRICES OF FARM ANIMALS

JANUARY 1, 1880.



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1880.

NUMBERS AND PRICES OF FARM ANIMALS.

HORSES.



Our returns show that the number of horses in the country is about 25 per cent. greater than last year; this implies the enlargement of this class of our farm stock by about a quarter million of animals.

The States upon the Atlantic slope from Maine to Georgia, report their number of horses as about the same as last year. The increase has been along the Gulf coast, and in the States west of the Allegheny Mountains. The Eastern States are not very extensive horse-producers, except in the finer grades. Down the coast, in the agricultural regions of the South, many counties find a profit in horse-breeding, and several of these report an improved class of animals. Other counties, however, have not yet been able to see the wisdom of this policy, and still continue the production of inferior horses. Economic reasons will, sooner or later, correct this fault, and enable farmers to see that their true interest lies in the raising and marketing of more valuable stock.

The Gulf States report an average increase of 5 per cent., the greatest enlargement being in Louisiana and Texas. In many counties of the eastern cotton-growing States, which have hitherto depended upon Kentucky and Tennessee for their supply of horses, there is a disposition to enlarge and improve domestic production. In Texas, especially where the native breed is largely crossed with Mexican mustangs, farmers have begun to improve their stock by the importation of superior animals. The increase of agricultural settlement, in many stock-raising counties, has contracted the range of free pasturage. Horse raisers are beginning to regard some of the stricter economic conditions of the older States. Poor horses will no longer pay the expense of raising, and hence better breeds have been introduced. It will require time, however, for the extension of this improvement throughout the States.

The Southern inland States report an increase of 3 per cent., on the whole, ranging from 1 per cent. in Tennessee to 6 per cent. in Arkansas. The revival of mining industry in different sections has created a local demand for horses. In some counties, especially of Tennessee, which formerly produced a large number of this class of animals, the farmers have found it profitable to turn their enterprise in other directions.

The States north of the Ohio River report about 1 per cent. increase on the whole; the large increase of Ohio and Michigan was about balanced by the decline in Illinois. This last-named State is the largest

horse-producing State in the Union, and reports considerably over a million of this class of farm animals. In the older counties of these States specific lines of breeding are becoming more general. The demand of the Eastern States has caused many farmers here to import Clydesdale horses and superior French breeds. Heavy horses are in special request for Eastern shipment. In some cases this movement has taken all the surplus, and has even depreciated the stock of different counties. The temptation of advanced prices has led many to injure their stock by selling off their best animals. The inferior breeds are produced in this section to a smaller extent than formerly, and will probably be soon crowded out by the better classes.

The States west of the Mississippi report about 5 per cent. more horses than last year. Home production is here increasing, but it is supplemented by a very large importation from the States eastward. This is mostly due to the rapid extension of agricultural settlement. In the older settled States, Iowa and Missouri, the increase of the stock has been very limited in numbers but has greatly improved in character. The surplus production of these States has been largely absorbed by the demand of settlers in the newer States. Hence it is not surprising to find that the latter have greatly increased their number of horses: Kansas, 9 per cent.; Minnesota, 11 per cent.; Nebraska, 12 per cent. Many valuable breeds have been brought westward by immigrants. The native scrubs and ponies of the pioneer counties are being replaced by heavier and more substantial horses from the East. In time agricultural enterprise here will find an eligible field in the production of finer grades. The native stock is largely crossed with Mexican mustangs, and to these the blooded stock of Eastern farmers show a very great superiority.

On the Pacific coast, California reports the number of horses about the same as last year. In some counties there has been a positive decrease for several years owing to the enhanced value of pasture. But the falling off has been entirely in the poorer class of animals. Oregon reports an increase of 7 per cent.

The Territories report an enlarged number of horses, a comparatively small portion being of home production. Immigration is greatly enlarging and improving this class of live stock.

The condition of horses all over the country is excellent. The States along the Atlantic slope, Florida and Alabama, report no cases of horse malady of any kind. Mississippi had a few cases of blind-staggers, a disease produced by improper feeding and treatment. In some parts of Texas the severe drought reduced the area of pasture, and consequently stock of all kinds was left in poor condition, but no diseases are noted. In Arkansas a few cases of blind-staggers are attributed to feeding unsound corn. In Clarke County, Ohio, a few cases of hay-fever were fatal. Noble County, Indiana, notes the prevalence of distemper in some localities. West of the Mississippi River the condition of horses appears to be uniformly good, both in States and Territories. The same remark applies to the Pacific coast.

The prices of horses obtained by the farmer show some increase over last year, but not in proportion to the advance in prices of crops. Horses less than a year old increased 5 per cent. in the whole country. It is remarkable that the greatest increase, 13 per cent., is in the New England States. Here, however, what horse-breeding is carried on is with breeds of superior value.

In the Middle States the average price of colts declined 4 per cent., and in the South Atlantic States 3 per cent. In all the other sections the average increased; in the Gulf States, 2 per cent.; in the Southern inland States, 10 per cent.; in the States north of the Ohio, 7 per cent.; in the States west of the Mississippi, 6 per cent.; in the Pacific States, 3 per cent.

Yearling horses advanced in price 3 per cent. on the whole, ranging from 1 per cent. in the Middle States to 6 per cent. in the States occupying the eastern slope of the Mississippi, from Tennessee to Minnesota.

Horses between two and three years of age increased but 1 per cent., ranging from 1 per cent. less in the Middle States to 9 per cent. advance in the States north of the Ohio River.

Horses three years old and older advanced about 8 per cent. in value during the year. The New England States report the large increase of 19 per cent., while the next section, the Middle States, fell off 2 per cent. The Pacific States declined less than 1 per cent. The other sections all show increase, viz: South Atlantic States, 3 per cent.; Gulf States, 3; Southern inland States, 6; States north of the Ohio River, 3; States west of the Mississippi, 1.

MAINE.—*Cumberland*: Number increased; good demand and better prices. *Waldo*: Wintering well.

VERMONT.—*Essex*: All stock very healthy and in fine condition. *Orleans*: Common stock.

MASSACHUSETTS.—*Berkshire*: Slight increase in number.

RHODE ISLAND.—*Washington*: Few raised.

NEW YORK.—*Genesee*: About the same number as last year, but prices advanced. *Rockland*: Much attention given to raising fine stock.

NEW JERSEY.—*Morris*: Growing demand. *Warren*: Numbers about the same as last year, with prices looking up.

PENNSYLVANIA.—*Armstrong*: Ready sale at advanced prices. *Bucks*: Slight increase. *Columbia*: Rather low; short hay-crop. *Butler*: Good demand for all qualities, and fair prices. *Fayette*: Number reduced; scarcity of feed. *Monroe*: Numbers increase yearly; all stock in good condition. *Indiana*: Decreased in number owing to low prices. *McKean*: Good demand for them in the oil districts.

VIRGINIA.—*Botetourt*: We have a greater accumulation of all kinds of stock than at any time since the war, and as a general thing in better condition. *Chesterfield*: Numbers increasing and quality much improved. *Halifax*: Healthy; more attention given them. *Nansemond*: But little attention bestowed on stock-raising. *Northampton*: Farmers paying more attention to raising stock and to the introduction of improved breeds; prices rule low.

NORTH CAROLINA.—*Davie*: More in number than for several years. *Iredell*: Improvements made by the introduction of superior breeds. *Person*: Very few fine horses in this county. *Wilson*: Increase in all kinds of stock. *Yancey*: All stock is looking well; mild winter. *Nash*: Exempt from disease. *Haywood*: General tendency to improve the breeds.

SOUTH CAROLINA.—*Chesterfield*: None raised for market. *Colleton*: Great improvement; very few that are under size. *Barnwell*: Mostly from Kentucky and Tennessee. *Darlington*: Five per cent. more than last year. *Union*: No improvement in quality; prices about the same as last year; number decreased since the passage of the "stock law." *Laurens*: Brought from Kentucky and Tennessee, where forage is cheap. *Aiken*: Few raised and none sold under 3 years old.

GEORGIA.—*Baker*: All domestic animals are in good condition. *Berrien*: All stock healthy. *Cobb*: Number increased 10 per cent. over last year. *Fannin*: Numbers reduced by large sales to drovers. *Habersham*: Better prices than last year. *Warren*: No diseases; all stock is looking well. *Jefferson*: But little variation from last year. *McDuffie*: More attention given to raising stock than at any time since the war. *Wilkes*: Brought from Kentucky and Tennessee. *Stewart*: But few raised here.

FLORIDA.—*Calhoun*: County filling up rapidly; numbers of all kinds of stock greatly increased. *Columbia*: Increase both in number and quality. *Suwannee*: Stock is in good condition; mild winter.

ALABAMA.—*Bullock*: More attention given to raising stock, and county being gradually supplied with home-raised horses. *Barbour*: Better stock and improved breeds; more care taken in raising them. *Crenshaw*: All stock doing well and on the increase; very mild winter. *Franklin*: One of the mildest winters ever known here. *Hale*: No attention given to stock-raising.

MISSISSIPPI.—*Grenada*: Few raised. *Panola*: Prices 10 to 15 per cent. higher than last year. *Fazoo*: Number increased; some interest now exercised in improving the breed. *Carroll*: Very few raised. *Rankin*: All stock free from disease. *Starkey*: Stock interest increasing. *Tate*: Supplied from the markets of Tennessee; considerable number of fatal cases of blind-staggers. *Bolivar*: County supplied mostly from Kentucky and Missouri. *Covington*: In good condition; no cold weather. *Simpson*: Numbers about the same as last year; "Kansas fever" reduced prices.

LOUISIANA.—*Saint Landry*: About the usual number; many fine blooded, and command a high price; grass is good nearly all the year. *Terre Bonne*: All of our good horses are raised in Kentucky. *Richland*: Mild winter; all stock are in good condition.

TEXAS.—*Nacogdoches*: Some cases of glanders. *Bastrop*: Looking thin; short crops. *Bosque*: Owing to protracted drought, there is a scarcity of both grass and water; large herds driven away for feeding. *Caldwell*: Decrease in numbers; range not so good as formerly, owing to the large immigration. *Dallas*: Much neglected; the greater portion crossed with Mexican or mustangs. *Ellis*: Improved in quality and increased in price. *Hopkins*: Small in size and mixed with Spanish and Indian stock. *Guadalupe*: Drought caused short feed and scarcity of water. *Tarrant*: Severe drought; large numbers taken west to a better range. *Trinity*: Prices are about the same as last year; feed very scarce. *Upshur*: Increase in numbers, but decrease in value. *Victoria*: No demand; prices very low. *Fannin*: Number increased; more care given to raising them. *Coleman*: Protracted drought caused a decrease in numbers; many herds taken to other sections to graze. *Grimes*: All kinds of stock are in poor condition. *Bezar*: Kansas markets regulate the prices of stock horses; \$7 is the average price per head by the drove. *Hunt*: All, with but few exceptions, are of native stock; prices lower than they have ever been before. *Palo Pinto*: Increased numbers; large immigration.

ARKANSAS.—*Polk*: All stock improving. *Pope*: Small increase. *Independence*: A few have died of a disease supposed to be the blind-staggers, produced by eating unsound corn. *Clark*: More attention is being paid to stock of all kinds.

TENNESSEE.—*Anderson*: All surplus horses find a ready sale in Southern markets. *Grainger*: All kinds of stock low in price, and in excess of demand. *Greene*: Good supply and but small demand. *Hamblen*: Slight increase in numbers, and prices advanced. *McNairy*: Many farmers have stopped breeding them, as there is no profit in the business. *Smith*: About the same as last year. *Sumner*: Prices low and no demand. *Loudon*: Stock of all kinds have advanced; business prosperous and people in

better spirits. *Robertson*: Farmers have quit raising horses and mules. *McMinn*: Increased in value from 20 to 30 per cent. during the past two months. *Blount*: Slight decrease. *Decatur*: About the same as last year. *Dickson*: Gradual increase of all kinds of stock. *Dyer*: All stock are wintering well.

WEST VIRGINIA.—*Doddridge*: About the same as last year. *Marshall*: All stock in good condition. *Mercer*: More on hand than at this time last year. *Upshur*: All stock are in good condition; no winter weather yet. *Ritchie*: Stock looks remarkably well. *Boone*: Overstocked.

KENTUCKY.—*Boyd*: In better demand; the revival of the iron business has caused general prosperity. *Calloway*: Not so many on hand as usual; large numbers taken to Southern markets. *Cumberland*: All stock is in good condition. *Edmonson*: Common grades. *Nicholas*: Low. *Garrard*: Excellent condition; mild winter. *Roane*: Receives but little attention; low prices. *Allen*: The increase has been about equal to the demand. *Ballard*: Better stock is now being introduced.

OHIO.—*Licking*: All kinds of domestic animals are in good condition. *Preble*: Number decreased; many marketed; demand good. *Warren*: All stock advanced 20 per cent. in value during the past eight months; all kinds in good demand. *Wayne*: All kinds of stock are in better demand than one year ago. *Williams*: Less number than last year; farmers sold all they could spare at advanced prices. *Montgomery*: Many fine selections shipped East, which reduces the number. *Sandusky*: All farm-stock advanced in price. *Union*: A large number of Clydesdale and French horses produced. *Clarke*: Many farmers breeding heavy horses for Eastern markets; some fatal cases of hay-fever. *Geauga*: About as many were sold out of the county as were raised last spring. *Henry*: About the usual number. *Adams*: More sold than usual, and a less number of colts raised.

MICHIGAN.—*Clinton*: Light horses depreciated in value, but there is a good demand for heavy ones. *Cass*: Norman and Clydesdale are being introduced to a considerable extent. *Lake*: All stock are in good condition and free from disease.

INDIANA.—*Franklin*: Limited number. *Jay*: Farmers are improving their stock. *Jennings*: Stock is looking well. *Decatur*: Numbers and prices about the same as last year. *Noble*: Distemper to some extent among horses. *Starke*: Number increased, and are now taking the place of mules.

ILLINOIS.—*Stephenson*: All stock in good condition. *Kankakee*: Good demand. *Peoria*: Numbers and condition of all domestic animals remain practically unchanged. *Grundy*: Domestic animals are in brisk demand at remunerative prices. *Lee*: Slight increase in number. *Saint Clair*: No stock raised in this county. *Bureau*: Same in number, but improving in quality each year, as the stock is bred from improved Norman and Percheron breeds.

WISCONSIN.—*Buffalo*: All stock is in good condition. *Racine*: About the same as last year. *Crawford*: More farm animals of all kinds are being raised. *Rock*: About enough for home demand. *Douglas*: A great many French and Indian ponies. *Walworth*: Same in number as last year, but lower in price. *Marathon*: Numbers increased. *Door*: Large numbers brought from Illinois.

MINNESOTA.—*Rice*: Brought from Iowa. *Steele*: Improved breeds of all kinds of farm stock are rapidly gaining a foothold; prices advanced. *Fillmore*: Small increase of all farm animals. *Wadena*: Large increase; immigration. *Traverse*: Large increase. New county; two years ago we had but three settlers, now we number over 250.

IOWA.—*Calhoun*: Perfectly healthy. *Guthrie*: Stock of all kinds, except hogs, have been remarkably free from disease. *Appanoose*: Farm stock in excellent condition. *Hardin*: All stock, hogs excepted, is doing well. *Monroe*: No great change in domestic animals either as to numbers or value. *Polk*: More interest manifested in introducing improved breeds. *Washington*: All stock, except hogs, is doing well. *Henry*: Prices and quality a little better than last year. *Ringgold*: Numbers the same, but prices advanced.

MISSOURI.—*Moniteau*: Health of all stock is good. *Platte*: But little demand. *Putnam*: Good winter for stock; market good and prices remunerating. *Schuyler*: Stock of all kinds are looking fine; dry, open winter. *Callaway*: A large number of Kentucky and English blooded horses; some pure bred Norman and Percheron. *Clay*: No material change as to numbers. *Howell*: Wintering well. *Dallas*: Looking well; good demand; no diseases.

KANSAS.—*Dickinson*: Large increase. *Ford*: Brought from Texas. *Wallace*: Few raised. *Davis*: Increase of all kinds of farm stock ascribed to our large immigration of thrifty people, who brought stock with them. *Graham*: Immigration has been so great that it is impracticable to estimate the large increase of farm stock. In twelve months we have grown from 300 to over 2,000 in population. *Harvey*: All stock is in better condition than at this time in any former year. *McPherson*: Increase in all kinds of farm stock. *Rush*: Immigrants during the year brought in large numbers. *Washington*: Demand for a better class of horses, and also large ones. *Chase*: Mostly mixed with the Indian breeds. *Lane*: All ponies; ours is a new county. *Ellis*: Numbers increased by importations.

NEBRASKA.—*Buffalo*: All farm stock is increasing. *Dawson*: Very few horses change hands under three years old. *Fillmore*: All farm animals are in good condition. *Gosper*: Numbers increased. *Otoe*: Prices of all farm stock advancing. *Greeley*: This county has more than doubled in population during the past year; large increase in all kinds of farm animals. *Polk*: Generally healthy. *Nemaha*: Numbers increased, but lowest prices for twenty years. *Lancaster*: Looking well.

COLORADO.—*El Paso*: All kinds of farm stock increased. *Douglas*: We have the fine Norman, worth from \$50 up, to the Mustang and Broncho, from \$5 to \$50. *Weld*: American stock commands a much higher price than the native breeds. *Fremont*: Prices range from \$40 to \$150 for a Broncho to a good American.

CALIFORNIA.—*Contra Costa*: Good demand. *Lake*: Breed is being improved. *Napa*: The numbers have been decreasing for several years; pasture being too valuable to keep large herds of California horses. *San Diego*: Scarcely any American stock.

OREGON.—*Clackamas*: Numbers about the same, but prices a little better than last year.

NEW MEXICO.—*Colfax*: Strictly a stock county; principally California, Texas, and Spanish breeds. *Mora*: Small Spanish breed.

DAKOTA.—*Pembina*: Increase in farm stock ascribed to immigration. *Moody*: All stock is in good condition; abundance of corn and good hay. *Armstrong*: New county; increase ascribed to immigration. Large breeds needed for freighting purposes.

INDIAN TERRITORY.—*Choctaw*: The Choctaws let their stock shift for themselves both winter and summer; ponies are seldom sold under three years old. Some few Indian farmers have good stock of all kinds, and they are improving the whole Indian country.

MONTANA.—*Deer Lodge*: Good American horses are high; the prices given are for Indian and half breeds.

MULES.

This class of farm animals increased, on the whole, about 1 per cent. In New England they are used to so small an extent that our correspondents are not able to obtain any satisfactory information in regard to them. Hence the returns from that section make no mention of them.

In the Middle States they fell off 2 per cent. The numbers reported in this section are not large. They are in demand for use in the coal mines of Pennsylvania and at the iron works in different parts of that State. There appears to be very little home production in this section.

In the South Atlantic States there was a slight advance, 1 per cent.

In the Gulf States they increased 4 per cent.; Texas reporting 6 per cent. In the last-named State they are superseding ponies and mustangs. They are produced in some counties, and the domestic product shows improved qualities. The Southern Inland States fall off about 3 per cent. In some counties they have been sold for shipment in such numbers as to cramp the home market. A sudden increase of prices for shipment South caused a depletion of the stocks on hand.

The States north of the Ohio River fell off about 4 per cent., the losses in the lower sections not being met by the increase in the more northern regions. The production has probably not fallen off, but the demand of other States has depleted the stocks.

West of the Mississippi the number enlarged 3 per cent. Production, except in Missouri, is on a limited scale, but the importations have been very large, especially by immigrants from Central and Southern States.

The Pacific States about maintain the aggregate of last year, which is by no means imposing. The condition of these animals is generally good. No disease is reported among them, except a few cases of blind staggers in Arkansas, the result of feeding unsound corn.

The average price of mules under one year for the whole country shows an increase of 8 per cent. over the last year, but there is a wide range between different sections. The Middle States and the Pacific coast show an increase of 10 per cent., while the Gulf States fall off 20 per cent. The other sections all show increase from 1 per cent. in the South Atlantic States to 9 per cent. in the Southern Inland States.

Yearling mules have advanced 10 per cent. on the whole, the increase ranging from 2 per cent. in the South Atlantic States to 12 per cent. on the Pacific coast.

Mules between one and two years old realized about 5 per cent. higher prices than the previous year. The increase in different sections ranges from 2½ per cent. in the Middle States to 10 per cent. in the Southern Inland States; the Pacific States fall off 2 per cent.

Mules three years old and upwards average 5 per cent. higher in price than last year, ranging from a loss of 6 per cent. on the Pacific coast to a gain of 11 per cent. in the Gulf States.

NEW YORK.—*Sullivan*: Very few. *Saint Lawrence*: But few used here.

NEW JERSEY.—*Atlantic*: Very few in this county. *Hudson*: None raised.

PENNSYLVANIA.—*Bucks*: Slight increase. *Cameron*: Brought from Buffalo for use in the coal mines. *Monroe*: Numbers increase each year. *Northumberland*: Brought in from other States for use in the mines. *Indiana*: Used only at the iron-works. *Fayette*: Good demand in the coal sections. *Luzerne*: Raise none; between four and five hundred used up in the mines each year. *Tioga*: Scarce. *Clearfield*: But few in number; prices rate about the same as horses.

VIRGINIA.—*Chesterfield*: Better demand.

NORTH CAROLINA.—*Nash*: Doing well.

SOUTH CAROLINA.—*Darlington*: Five per cent. increase in numbers.

GEORGIA.—*Cobb*: Number increased 5 per cent. over last year. *Stewart*: None in the county.

ALABAMA.—*Barbour*: Brought from Kentucky and Tennessee.

MISSISSIPPI.—*Simpson*: More than usual; owing to the "Kansas fever," many colored people have sold off their stock.

TEXAS.—*Tarrant*: Taking the place of ponies. *Upshur*: Hold up very well. *Victoria*: A better class is being raised. *Waller*: No attention is given them. *Hunt*: But few in the county, and they are of inferior stock.

ARKANSAS.—*Pope*: Numbers increased. *Independence*: Some losses by blind staggers; supposed cause, eating unsound corn.

TENNESSEE.—*Greene*: In demand and scarce. *Hamblen*: Not so plenty as last year; prices advanced 20 per cent. *Smith*: Good demand. *Sumner*: Number decreased 12½ per cent. *Bradley*: In good demand at fair prices for shipment South. *Laurence*: Decrease in numbers owing to the demand from the cotton States. *McMinn*: Increased in value from 20 to 30 per cent. in the past 60 days. *Blount*: Slight decrease on account of low prices of previous years.

WEST VIRGINIA.—*Calhoun*: Very few in the county. *Jackson*: Horses preferred.

KENTUCKY.—*Butler*: Some demand, but at very low prices. *Callaway*: Scarce; many taken to Southern markets. *Cumberland*: Large sales have reduced the number. *Edmonson*: Best of them have been sold. *Jessamine*: Low prices caused them to be neglected. *Logan*: Good prices have stimulated farmers to renewed efforts. *Nicholas*: Stock is low. *Allen*: The demand of the past year has greatly reduced the supply. *Taylor*: Increased demand from the South has made them very scarce. *Jefferson*: Not enough raised for home use.

OHIO.—*Union*: Not so many raised as a few years ago. *Cebauga*: Average value a little above horses. *Henry*: Increase in numbers, and growing in more favor for farm uses; prices rule a little above horses.

MICHIGAN.—*Hillsdale*: Numbers decreased.

INDIANA.—*Decatur*: Prices nearly the same as last year, with a slight decrease in numbers.

WISCONSIN.—*Dunn*: Brought from Iowa and Missouri. *Racine*: About the same as last year. *Rock*: But few. *Milwaukee*: None raised here, and but few used for farm purposes.

MINNESOTA.—*Chisago*: Brought from the Southern States.

IOWA.—*Polk*: Much attention given to improving the breeds. *Ringgold*: Growing in favor.

KANSAS.—*Dickinson*: Brought from Missouri. *Ford*: Brought from Texas, *Washington*: Better demand than usual. *Ellis*: Increase ascribed to importation.

MISSOURI.—*Johnson*: Last spring the "Colorado mining fever" took all our surplus stock. *Pettis*: Command a better price than horses.

NEBRASKA.—*Nemaha*: Growing more in favor for farm work.

NEVADA.—*Esmeralda*: Very few raised; will receive more attention next year.

CALIFORNIA.—*Contra Costa*: Few raised.

OREGON.—*Clackamas*: No demand, and but few raised.

MILCH COWS.

Milch cows increased in number about 1 per cent. compared with the previous year. There was a falling off on the Atlantic slope and in the States north of the Ohio River, but an increase in all the other sections of the country, especially in the States north of the Mississippi River and on the Pacific coast. There was a considerable westward transfer of cows by settlers occupying the new lands of the far West, and also an increased production in that region. In the Gulf States and inland Southern States there is a considerable increase.

The slight decline in numbers noted in the New England and Middle

States, and in the States north of the Ohio River, does not indicate a decline in the dairy interest, but rather a substitution of a better class of animals, the offspring of better breeds, in the dairies and factory farms of those regions. The slightly decreased number of cows in these States produce more butter and cheese, and of better quality, than was ever produced before. The immediate cause of the reduction in numbers appears to have been the selling off of surplus cows on account of low prices. The animals sold for the shambles were mostly of inferior breeds, and their disposal in this manner was a special benefit to the dairy and stock-raising interest.

West of the Mississippi the increase is reported at 6 per cent. in the number of milch cows. This estimate is probably below the real facts in the case, but immigration and agricultural settlement in those States is so active that it is difficult for statistical inquiry to keep pace with them. This has created a home market for surplus cows in these States, while a large number have been brought from the States east of the Mississippi. Of the adaptation of the northern portion of this region to the dairy industry there has been no doubt, but practical enterprise is reported in counties south of the line of the Missouri River, which indicate a special capability in this direction. The blue-grass has been grown further south in this region than has been popularly supposed, and several successful dairy farms on a large scale have been successfully established. The climate here admits of green feeding during a larger portion of the year than in States further north. A marked improvement of the dairy stock of this region is observable. It is stated that some dairymen have been able to reduce the cost of subsistence per cow to about five or six cents per day. If this fact be found to be of any extensive application, the problem of dairy production will be simplified and the consumption greatly increased.

The Pacific States also report an increase amounting to 4 per cent. over last year's number of cows. In several counties of California it is estimated that from a third to a half of the cattle are milch cows. California butter and cheese are taking advanced rank in the home market; a fact which shows an improvement not only in the animals but also in the methods of preparing butter and cheese for market.

In the States south of Mason and Dixon's line dairying has been of limited development, except in the northern sections. But several reports indicate an increase in the numbers, and an improvement in the quality of the dairy stock, in different localities. Milk and butter production promises to become more prominent among farm productions. In Arkansas and Texas the number is increased on the whole, and the character of the stock is improved. The cows of several large cattle counties in the last-named State are sent for a portion of the year to graze in the frontier counties. This system of herding can scarcely be made to harmonize with dairy production, but as agricultural settlement increases the range of free pasture becomes contracted. The cattle interests will

be compelled to adopt more economic methods and to enlarge and improve its dairy product.

The average price of milch cows is about $2\frac{1}{2}$ per cent. greater than last year. The Gulf States show a decline of 5 per cent. and the Southern inland States of 1 per cent. All the other sections show an increase, which in the States west of the Mississippi River amounts to 9 per cent.; the other sections range down to $1\frac{1}{2}$ per cent. in the New England States.

The condition of this class of farm animals is good in all sections of the country. No prevailing diseases are reported by any of our correspondents.

MAINE.—*Cumberland*: Numbers increased; prices are some lower owing to the advance in corn and hay.

VERMONT.—*Orleans*: Our principal stock.

MASSACHUSETTS.—*Berkshire*: About the usual number. *Plymouth*: Numbers increasing.

NEW YORK.—*Chemung*: This is a dairy country; several creameries in operation. *Genesee*: Number diminished owing to the low price of butter and cheese in the early part of the season.

NEW JERSEY.—*Morris*: Numbers increasing. *Hunterdon*: Good demand.

PENNSYLVANIA.—*Bucks*: Dairy farming is growing into one of our leading industries; milch cows increasing in number, as well as improving in breed. *Sullivan*: Better demand since the advance in butter. *Lehigh*: Several creameries established during the past year, which accounts for the increase of numbers. Pleuro-pneumonia reported at one farm.

VIRGINIA.—*Chesterfield*: Numbers increasing, and quality rapidly improving. *Fairfax*: Plenty and cheap.

NORTH CAROLINA.—*Nash*: Doing well.

TEXAS.—*Upshur*: Decrease in numbers, and prices lower. *Victoria*: General improvement. *Hunt*: One-fourth of them removed to frontier counties to graze.

ARKANSAS.—*Pope*: Slight increase.

TENNESSEE.—*Hamblen*: No demand. *Blount*: Dull sale and prices low.

OHIO.—*Medina*: Numbers diminished. *Geauga*: Low prices of last year caused many to dispose of their cows and invest in sheep. *Williams*: Increase in the dairy business. *Henry*: Large numbers bought for the Buffalo market during the past month.

MICHIGAN.—*Hilledale*: Good demand since the rise in butter.

INDIANA.—*Starke*: Increase in number.

ILLINOIS.—*Whitesides*: The activity in the dairy business has increased the numbers.

WISCONSIN.—*Racine*: Numbers decreasing. *Calumet*: Low prices of dairy products in the early season caused many farmers to dispose of their cows. *Rock*: Increased numbers, but low prices. *Walworth*: Few in number and low in price, but since the advance in butter they are looking up. *Brown*: A large number sold owing to the scarcity of hay.

IOWA.—*Muscatine*: Numbers decreased; dairy farming is not considered profitable. *Howard*: The "herd law" has caused a reduction in numbers. *Ringgold*: No demand.

KANSAS.—*Dickinson*: Improved breeds are being introduced; dairy interests increasing. *Leavenworth*: Large increase.

NEBRASKA.—*Dawson*: Mostly stock, calves running with them until weaned. *Gosper*: Number increased.

CALIFORNIA.—*Napa*: Dairying not so extensively followed as some years ago; it still pays in some localities. *Plumas*: Dairy farming is our principal agricultural industry; about one-half of our cattle are milch cows.

OREGON.—*Clackamas*: More plentiful than last year at this time.

OXEN AND OTHER CATTLE.

Cattle, including oxen, fell off about 1 per cent. on the whole. The New England States increased 2 per cent., the States west of the Mississippi 3 per cent., and the Pacific States 4 per cent. The South Atlantic States and the States north of the Ohio River about maintain their last year's aggregate. The Middle States fall off 3 per cent., the Gulf States 5 per cent., and the Southern inland States 2 per cent.

The increase in the New England States is not to be referred to an increased production of animals in that section, but to an importation of cattle from the Middle and Western States. Our correspondents in several counties note the decreasing number of oxen. Cattle as draught animals are superseded by horses in the older States of this region to an increasing extent as time passes.

Several correspondents in the Middle States note the diminished number of cattle wintered in their counties on account of the short crop of hay and the scarcity of other winter food. The disuse of oxen as draught animals is also noted. In many cases no calves are raised, but are sent to market as veals. The practice of importing western cattle to fatten for market has been growing in this section, but in many localities the scarcity and high price of forage have considerably restricted this branch of the cattle industry. The same cause has also depressed the price of cattle for feeding and still further restricted home production.

The South Atlantic States report about the same aggregate as last year. In Craig County, Virginia, several fatal cases are reported of a disease designated by the unmeaning word "murrain." In Halifax County the "Carolina distemper" has embarrassed the cattle interest to a considerable extent. These are the only cases of disease noted in this section. In South Carolina the "no fence" law has considerably changed the economic conditions of the cattle industry. The requirement upon cattle-owners to restrain the depredations of their stock has caused them to part with less valuable animals and to restock their herds with better breeds. An increased amount of beef-packing is noted in Georgia.

In the Gulf States the number of cattle have increased in all except Texas, which reports a decline of 7 per cent. As this State contains about five-sixths of the cattle in this section, this decrease absorbs the increase in the other sections and creates a deficit of 5 per cent. on the whole. The conservative tendencies of the cattle men of Florida are still seen in their clinging to the old native breeds, but in Alabama we have reports of substantial improvement in this respect. Several correspondents in Mississippi note heavy shipments to the New Orleans market. In some cases the native stocks have been considerably reduced by the demand for shipment. In Texas the summer drought and consequent destruction of forage caused the removal of immense droves to the

frontier counties to find pasture; in some cases the drives were 300 miles in extent. The occupancy of the land by crop farmers has also narrowed the range and rendered subsistence more precarious. This has induced farmers to introduce better breeds of cattle, especially shorthorns. The indications are multiplying that the cattle business in Texas is undergoing a revolution and adapting itself to changed circumstances and economic conditions. The production of the old, lanky, long-horned, cheap "Texan" cattle which some ten years ago made such a formidable irruption upon the markets of the country is no longer profitable.

The Southern inland States also show a decline in the numbers of cattle. Our reports from different sections of this region show the business in quite different aspects. In some cases prices are low, with no demand. This is often the result of scant forage-crops, and in other cases of the inferior quality of the animals disposable by the farmers. In other cases a brisk demand has not only drained off the surplus, but has considerably reduced the stock cattle. This is more particularly noticeable in Kentucky. Marshall County, in this State, shipped 35 per cent. of her entire stock to other States. Gibson County, Tennessee, exported 20 per cent.

Of the States north of the Ohio River the increase in Michigan and Illinois is just sufficient to counterbalance the slight decline in the other three States, making the aggregate for this section about the same as last year. A brisk trade eastward is especially noticeable, the demand of which accounts for the reduction of the stocks in many counties. From our regular and occasional correspondence, as well as from intelligent discussions and statements in the agricultural journals, we are assured that a marked improvement in the quality of the cattle of this region is constantly going on. An able writer in the National Live-Stock Journal, whose name has been identified with the agricultural progress of Ohio for a quarter of a century, declares that there are more thorough-bred cattle in that State than at any former period, though the general aggregate has been reduced. The number of cattle on the farms of the Northwest is less than ten years ago, yet it is believed that the meat production is much larger and of better quality. The favorite breeds are the Durham, Jersey, Ayrshire, Devon, and Hereford. The short-horn blood is now in process of dissemination to an extent never before known. The production of thorough-bred cattle has become an attractive and profitable business, while the improvement of the common stock by crosses with blooded animals is a matter of general policy. There is, however, room for vast improvement in this direction yet. Working oxen are disappearing in many parts of this region. Door County, Wisconsin, has depleted her stock of cattle by exchange for horses from Illinois.

West of the Mississippi the stock of cattle has increased 3 per cent. The older-settled States, Iowa and Missouri, report but 1 per cent., but

Kansas enlarges her stock 12 per cent. and Nebraska 16 per cent. The stocks of many counties were enlarged by herds from a distance brought in to consume their ample crops of low-priced forage. A correspondent in Minnesota complains that the farmers of his county do not raise enough corn, and that, consequently, a large proportion of their cattle must be driven into Iowa. The wants of an enormous immigration have created a home market for domestic production, and hence have retained at home a portion of the surplus which otherwise would have been sent eastward. Those counties in which the grain-raising interest has been discouraged by short crops or by the ravages of grasshoppers have now gone into cattle-raising with great zeal. Pulaski County, Missouri, reports about fifty fatal cases of black-leg. A few cases of the same among calves are noted in Marion, Kansas. With these exceptions the condition of cattle in this section is good. From Kansas we have the same report as from Texas, that as agricultural settlement increases the range of free pasture is diminished and, consequently, the number of cattle decreases. This refers, however, only to the scrubby native stocks. The better breeds are introduced every year to an increasing extent, and the character of the animals produced is more profitable to the farmer and creditable to the stock-raising interest of this section. Seward County, Nebraska, reports a demand for cattle which has left scarcely any but milch cows behind. In Colorado "American cattle," that is, cattle imported from the East, command a much higher price than the scrawny Mexican breeds called "natives." In Fremont County the cattle-men have banded together in illegal combinations to expel sheep husbandry from the county entirely. This policy is violative of personal rights, besides being short-sighted; it will not be able to stand. The same dictatorial power may attempt in the same way to restrict soil culture. It is as justifiable in one case as in the other. The disuse of oxen is a marked feature even in the new States.

On the Pacific coast California has fallen off 1 per cent. while Oregon has increased 7 per cent. in the number of cattle. The work of improvement is visible also in this region.

The Territories have increased their stock about 8 per cent. over last year. Many centers of promising production have been inaugurated in these inchoate communities, and the prospect is that it will soon become a great and thriving interest.

The average price of yearling cattle, taking the whole country through, is 6 per cent. greater than last year. All sections of the country show an increase except the Pacific States.

The average price of two-year-old cattle increased about 6 per cent. There was a falling off in the Gulf States, the Southern inland States, and the Pacific States; in the other States the average has increased.

Cattle from two to three years old advanced about 3 per cent. in average price. There was a marked decline in New England—11 per cent.—and on the Pacific coast—8 per cent.; there was also a slight decline in the South Atlantic States, but an increase in all the other sections.

In the price of cattle of three years and upwards there is a falling off of 2 per cent., taking all sections of the country together. New England fell off 8 per cent. and the Middle States 6 per cent. There was also a slight decline in the Gulf States and the Pacific States. The increase in the other sections was not sufficient to counteract this decline.

The condition of cattle is remarkably good. Only few counties report prevailing diseases.

MAINE.—*York*: "The so-called improved breeds of cattle do not sell for one whit more than the so-called scrubs."

VERMONT.—*Chittenden*: Went into winter quarters looking well. All kinds of stock are doing well. *Orleans*: Not one farmer in ten keeps oxen.

MASSACHUSETTS.—*Plymouth*: Numbers decreasing.

NEW YORK.—*Saint Lawrence*: Limited number. *Tioga*: Not so many being wintered as usual owing to the scarcity of hay. *Washington*: Prospects of a long winter, with not an overabundant stock of forage.

NEW JERSEY.—*Atlantic*: Not a yoke of oxen in the county. *Hudson*: None raised; calves vealed.

PENNSYLVANIA.—*Columbia*: Rather low; short crop of hay. *Sullivan*: Lower in price than at any time since 1861; short hay-crop. *Elk*: But little raised or sold in this county. *Butler*: Overstocked; slow sale. *Fayette*: Numbers reduced owing to scarcity of feed. *Luzerne*: Four-fifths of our beef-cattle come from other counties. *Centre*: Prices depressed; grasshoppers and drought.

MARYLAND.—*Montgomery*: Many cattle from other States are fattened here for sale to butchers. *Prince George's*: Prices are very low.

VIRGINIA.—*Craig*: A considerable number of stock-cattle have died from murrain. *Halifax*: "Carolina distemper" greatly hinders more extensive efforts. *Rockingham*: All stock healthy and free from disease. *Bland*: No bad weather yet; stock looking well. *Middlesex*: All stock is healthy; short hay and corn crops have decreased values.

NORTH CAROLINA.—Wintering well and in good condition. *Iredell*: Improved breeds are being introduced. *Haywood*: General tendency to improve all stock.

SOUTH CAROLINA.—*Colleton*: Remarkable improvement in all kinds of stock. *Ches-ter*: Improving in quality, but on account of the passage of the "no fence law" the numbers have decreased. *Anderson*: Very few raised.

GEORGIA.—*Cobb*: About the usual number. *Colquit*: Looking well; warm winter. *Harris*: In better condition than usual; mild winter. *Paulding*: All stock are in good condition. *Thomas*: No fine stock. *Murray*: About the same as last year. *McIntosh*: Increasing interest. *McDuffy*: Have packed more meat of our own raising than for any winter in ten years.

FLORIDA.—No improved stock.

ALABAMA.—Numbers increased; better stock and improved breeds. *Conecuh*: Large increase. *Colbert*: Stock of all kinds are in better condition than for years; no disease.

MISSISSIPPI.—*Grenada*: The heavy shipments to the New Orleans market have decreased the number. *Attala*: All stock is free from disease and doing well. *Copiah*: Very warm winter; loss of \$10,000 by meat spoiling. *Winston*: Heavy shipments to New Orleans. *Simpson*: Good demand.

TEXAS.—*Nararro*: Low condition owing to scarcity of water and pasture during summer months; not enough water has yet fallen for stock on the prairies. *Hunt*: One-half of our stock removed to frontier counties to graze. *Williamson*: Owing to protracted drought over one-third of all kinds of stock have been driven to other counties. *Coleman*: Large numbers have been sent to other counties for a better range. *Anderson*: Bad condition; drought and scarcity of water. *Bastrop*: Looking well. *Bosque*: Failure of water and grass made it necessary to drive large numbers from 200

to 300 miles distant. *Dallas*: Native breeds are running out and being replaced by good grades of short-horns. *Ellis*: Large herds have been driven west for food and water; county filling up with immigrants; range not so good as formerly. *Hopkins*: Large droves have been sent west for better range. *Rockwall*: Many herds driven to other counties to range. *Burnet*: Seventy-five per cent. have been taken out of the county on account of the failure of water and grass; considerable decline in prices. *Fannin*: More attention bestowed; numbers increasing.

ARKANSAS.—*Pope*: Falling off. *Ashley*: This county has not sold so many as formerly; farmers are now able to keep them.

TENNESSEE.—*Greene*: Low and no demand. *Knox*: Quality and condition much improved. *London*: Advanced. *Robertson*: About the same as last year. *Bradley*: Very low, and always will be until better breeds are introduced. *Gibson*: About 20 per cent. of our supply shipped to other markets. *McMinn*: Beef cattle advanced. *Blount*: No demand; prices low. *Dickson*: Gradually increasing; no disease. *Lewis*: Trade is lively and stock in good demand. *Dyer*: Wintering well.

WEST VIRGINIA.—*Marion*: The short hay-crop decreased the numbers. *Summers*: Lower in price than at any time since 1865. *Boone*: Stock cattle were slow sale last fall owing to failure of the hay-crop. *Randolph*: Falling off in numbers ascribed to scarcity of forage.

KENTUCKY.—*Crittenden*: Scarce, owing to the unprecedented demand throughout the summer. *Garrard*: Excellent condition; mild winter. *Marshall*: Thirty-five per cent. have been purchased and taken to other States during the past three months. *Roane*: Numbers are increasing yearly. *Nelson*: Discouraging outlook for wintering stock. *Fulton*: All stock are in good condition.

OHIO.—*Allen*: A marked improvement in the breeds. *Adams*: Are considered better property than formerly, and are receiving more attention. *Geauga*: More taken out of the county than were raised during the year. *Medina*: Number diminished. *Preble*: More plentiful than for several years. *Tuscarawas*: The mild winter has been very easy on stock.

MICHIGAN.—*Hilledale*: Working oxen have nearly disappeared. *Allegan*: Very few in the county. *Clinton*: Prices so low that it hardly pays for feeding and care. *Cass*: Very few oxen. *Chippewa*: This is the first fall that we have had a sufficient supply for the butchers; this industry is improving, but the breeds should be improved.

INDIANA.—*Crawford*: Unusually low; hay and forage very scarce. *Decatur*: Slight increase in price. *Hamilton*: About the same as last year. *Marion*: All stock are doing well. *Madison*: Hard winter for stock. *Starke*: Ready sale at good prices. *Orange*: Some good short-horns and Jerseys.

ILLINOIS.—*Brown*: Wintering well, but hay is scarce. *Hamilton*: The wet, rainy weather has been severe on stock. *La Salle*: All are healthy. *Livingston*: Good condition; fine winter weather. *Pope*: Large numbers have been taken out of county during the past three months.

WISCONSIN.—*Portage*: Many valuable cattle in our lumber districts. *Calumet*: Numbers decreased; short hay crop. *Walworth*: Numbers increasing. *Marathon*: Numbers increased. *Door*: Numbers depleted by exchange for horses from Illinois. *Richland*: All stock are doing well. *Monroe*: Largest shipments ever made in any one season.

MINNESOTA.—*Ramsay*: All kinds of stock have advanced in price. *Rice*: Large numbers taken to Iowa. *Fillmore*: A majority of our cattle are taken to Iowa and Illinois to fatten for eastern markets; we should raise enough corn to fatten them at home. *Polk*: Increase in all kinds of farm stock, ascribed to immigration. *Wadena*: Large increase in numbers: immigration.

IOWA.—*Calhoun*: Healthy. *Henry*: Having a good corn crop, many are brought here for feeding. *Polk*: Numbers decrease as our county fills up. *Sioux*: Numbers increasing since the production of cereals has been discouraged by the ravages of the grasshoppers. *Linn*: Generally in good condition. *Plymouth*: Increased interest in stock-raising since failure of our wheat crops.

MISSOURI.—*Johnson*: We are feeding 8,000 head of foreign cattle for the spring market. *Moniteau*: Prices are unexpectedly low. *Carroll*: A large number brought from Colorado to be stall-fed on our immense corn crop. *McDonald*: Hard times and the drought have diminished the number and prices of all farm animals. *Mercer*: All stock are healthy, hogs excepted. *Pettis*: All stock are in splendid condition; mild winter. *Pulaski*: In one section about 50 deaths are reported; supposed to be the black-leg. *Saint Clair*: Stock cattle increased 10 per cent.; many driven in from the South. *Cass*: About 10,000 beef cattle are being fattened for spring market. *Calhoun*: Fully one-half are graded short-horns.

KANSAS.—*Dickinson*: Oxen are on the decrease, but other cattle are on the increase. *Woodson*: Farm animals are very healthy. *Reno*: Every farmer that is able is raising cattle. *Marion*: All stock is looking well; a few cases of black-leg among calves. *Ellis*: Numbers decrease as our lands are taken up for agricultural purposes.

NEBRASKA.—*Seward*: Great demand for young cattle; scarcely anything left but milch cows. *Nemaha*: Numbers increased. *Lancaster*: Looking well.

COLORADO.—*Weld*: American stock commands a much higher price than native or Texan. *Fremont*: Cattle-men will not allow sheep to be kept in the county.

CALIFORNIA.—*Contra Costa*: Numbers decreasing. *Napa*: Very seldom used for work. *Solano*: No oxen used for work. *Ventura*: But few raised.

OREGON.—*Clackamas*: Numbers slightly decreased; many driven across the mountains to graze.

UTAH.—*Box Elder*: Already showing the effects of winter; hay advancing. *Cache*: Very early winter; fodder is very scarce; some may die if the severe weather continues; no disease.

INDIAN TERRITORY.—Texas murrain has made its appearance.

SHEEP.

Our returns show a marked increase in the number of sheep—6 per cent. for the whole country—during the last year. The only States that report a falling off are New Jersey, 2 per cent.; Pennsylvania, 1 per cent.; South Carolina, 3 per cent.; Kentucky, 1 per cent.; and Indiana, 2 per cent. On the other hand, Maine and Vermont increase each 7 per cent., Rhode Island 15, Texas 14, Kansas 19, Nebraska 20, and California 11.

The New England States increased 6 per cent. The advance in the price of wool and the enhancement of the demand for the increased consumption of our domestic mills has created an impression that a permanent increase in wool production will find ample market in the future.

In the Middle States, New York increased her stock 4 per cent. and Delaware 5 per cent., overcoming the loss in Pennsylvania and New Jersey and bringing the average increase of this section to 2 per cent. It is believed that the decreased numbers in Pennsylvania and New Jersey represent an increased product of better wool.

The South Atlantic States report about the same number as last year. Here the destruction by dogs has become a serious nuisance. In Virginia the "no-fence law" operates to the restriction of sheep husbandry, yet Virginia slightly increases her numbers. She is importing Merino breeds. The passion of the freedmen for dogs, which are left to forage for themselves, renders sheep-raising very unprofitable in many counties. This complaint is still more serious in North Carolina, which reports the

largest number of sheep killed by dogs. These domestic pests are, in some quarters, re-enforced by wolves.

In the Gulf States there is a general increase, except in Florida, which reports the same number as last year. Texas, the second sheep-raising State in the Union, increases her stock 14 per cent. In the latter State, at least in many counties, sheep are herded and thus more effectually protected from destructive animals. In Mississippi carnivorous birds and "wild hogs" are, in some cases, more destructive than dogs.

The Southern inland States report the same difficulties from the ravages of wolves and dogs. The effect of this nuisance is very decidedly felt in the entire break-up of sheep husbandry in some counties. The substitution of better breeds is noticeable, especially in Kentucky, where in some counties stocks have been depleted by shipments elsewhere. This section increased in numbers about 1 per cent.

In the States north of the Ohio River sheep husbandry has attained great prominence among agricultural industries, and has been noted for the superiority of its wool product. The Ohio dog law is working well, as is shown by the decreased number of depredations since its passage. The improvement in the breeds is still in progress. The numbers in this section increased but 1 per cent., but the quality of the flocks and the yield of wool more than compensate it.

West of the Mississippi River sheep husbandry has taken on a magnificent development. Colorado, the youngest State in the Union, is believed to contain at least 2,000,000 sheep, while Missouri, the next State of this section in rank, is estimated at 1,322,000. In this section some sheep-growers, impatient of the law's delay, have adopted "the shotgun and strychnine policy" for the abatement of the dog nuisance. In some sections the cattle-men have attempted to monopolize whole counties, forbidding the introduction of sheep husbandry. But in spite of this and other opposition, this branch of agricultural enterprise is destined to assert itself. Dog laws in different States are working well.

The Pacific States greatly enlarged their sheep industry during the last year. California added about three-quarters of a million sheep to her herds. The increase represents, generally, animals of superior breeds. Besides the increase of 11 per cent., a large number were sold for shipment to the new States east of the Rocky Mountains. Sheep-raisers here have learned the use of the shotgun and strychnine to protect their flocks from dogs. In some counties coyotes make away with many lambs. The Territories also show a marked increase. The condition of sheep is remarkably good.

The average price of sheep under a year old increased about 8 per cent., all the sections showing increase except the Gulf States. Sheep over a year old average 9 per cent. more than last year, all the sections showing increase except the Gulf States.

MAINE.—*Cumberland*: Increased in numbers and advanced in price owing to the rise in wool. *Somerset*: Do not know of any being killed by dogs during the past year.

VERMONT.—*Orleans*: Generally ordinary breeds.

MASSACHUSETTS.—*Berkshire*: Numbers slightly increased; comparatively few injured by dogs. *Plymouth*: But a few small flocks.

RHODE ISLAND.—*Washington*: About 15 head in each town killed by dogs.

NEW YORK.—*Rockland*: Kept in small flocks, and guarded at night to keep dogs from them. *Saint Lawrence*: Very few killed by dogs. *Chemung*: More farmers would raise them if the dogs would let them alone. *Genesee*: Increase in price of wool causes more to be retained on the farm.

NEW JERSEY.—More attention given to raising them than formerly.

PENNSYLVANIA.—*Bucks*: Efforts are being made to improve the stock. *Monroe*: Decrease yearly. *Butler*: Numbers decreasing; no profit in them, as the farms are growing smaller and dogs more plenty. *Northumberland*: Do not increase as they should; a good dog law wanted. *Sullivan*: "Dogs are a great drawback to sheep husbandry; yet many of our people oppose a dog tax." *Tioga*: No destruction by dogs. *Clearfield*: But few destroyed by dogs.

MARYLAND.—*Alleghany*: From 10 to 15 per cent. killed each year by dogs; "we want a national dog law." *Howard*: Farmers have been compelled to dispose of their flocks, owing to the destruction by dogs. *Montgomery*: Sheep husbandry if properly and legally protected would be profitable here. *Prince George's*: Stock-sheep are selling very low.

VIRGINIA.—*Fairfax*: Sheep husbandry is increasing; we have a law for protection from dogs. *Floyd*: None destroyed by dogs. *Halifax*: The "no-fence law" discourages sheep-raising. *Orange*: Merinos are being introduced on many farms. *Amelia*: Sheep husbandry is at a low ebb; the number of dogs is legion in every hut and cabin.

NORTH CAROLINA.—*Buncombe*: Dogs destroy a considerable number. *Cleveland*: The few that are here are very poorly cared for. *Chowan*: But few raised. *Davie*: No increase, and there never will be until the worthless dogs are killed. *Montgomery*: Many killed by wolves. *New Hanover*: Could be made profitable, but have been abandoned, owing to the destruction by worthless dogs. *Pamlico*: None raised: dogs. *Sampson*: Very few, if any, killed by dogs.

SOUTH CAROLINA.—*Pickens*: The dogs take many of them.

GEORGIA.—But little attention given to raising them, owing to the "cussed curs." *Columbia*: Low in price. *Colquitt*: Not looking well; fall was extremely wet. *Dooly*: Dogs have destroyed at least 10 per cent. *Habersham*: Numbers have decreased. *Johnson*: "Dogs have not been so destructive as formerly, owing to the manner in which sheep-owners handle their guns." *Baker*: Dogs killed 8 per cent.

FLORIDA.—*Bradford*: Very few taken by dogs. *Columbia*: Numbers decreased. *Santa Rosa*: Not so many destroyed by dogs as formerly.

ALABAMA.—"Ten per cent. killed by dogs and freedmen." *Bullock*: Sheep husbandry is succeeding well and found to be profitable. *Pickens*: Considerable destruction by dogs.

MISSISSIPPI.—*Greene*: Wild hogs and eagles are more destructive than dogs. *Panola*: But few raised. *Carroll*: A good many small flocks. *Choctaw*: Some killed by dogs and wolves; all stock is free from disease. *Wilkinson*: More than 20 per cent. killed by dogs. *Simpson*: Decreased.

TEXAS.—*Bosque*: Numbers increased and doing well. *Dallas*: Good breeds are being introduced. *Hopkins*: Loss caused by snow and cold weather in January, 1879. *Hunt*: But few in the county. *Kinney*: No loss by dogs, as they are always herded. *Live Oak*: Some killed by wolves. *Upskur*: Numbers increased, but not in value; none killed by dogs. *Victoria*: Doing well. *Burnet*: Command good prices, and are eagerly sought for; none killed by the dogs, as the flocks are herded. *Coleman*: Considerable destruction by wolves. *Bexar*: Dogs that would kill sheep cannot live in this county.

ARKANSAS.—*Ashley*: Sadly neglected; dogs and wolves. *Fulton*: Dogs and wolves have been very destructive. *Jackson*: Decreased in numbers; wolves and dogs. *Johnson*: Dogs took 15 per cent. *Pope*: About the same number; the breed is being improved. *Washington*: Over 7,000 sent to Kansas last month. *Clark*: Doing well.

TENNESSEE.—*Anderson*: Improved breeds are being introduced. *Bradley*: Have heard of no depredations by dogs. *Blount*: But few killed by dogs. *Decatur*: Very few raised; dogs. *Gibson*: Farmers would re-engage in sheep husbandry if they could be protected from depredations of dogs. *Henderson*: Increased interest in wool growing; unusually free from depredations of dogs. *Knox*: Quality and condition much improved; no depredations by dogs, the public mind having materially changed in favor of sheep. *Robertson*: Increasing. *Shelby*: Dogs took 10 per cent. *Dyer*: Increase greater than any other stock.

WEST VIRGINIA.—*Wayne*: Most every one has discontinued raising them owing to the depredations of dogs during the past ten years. *Summers*: Farmers not inclined to risk much capital in sheep; dogs. *Tyler*: "Our law-makers appear to think more of dogs than they do of sheep." *Jackson*: Breeds much improved. *Jefferson*: Amount of claims for sheep killed, payable out of dog-tax fund, was \$127, against \$600 eight years ago. This shows that the dog tax has worked well. *Roane*: Increasing yearly, and receiving much attention.

KENTUCKY.—*Butler*: Not much loss by dogs; many flocks sent away for want of good pasture. *Crittenden*: Scarce; unprecedented demand during the summer. *Jessamine*: Many died last winter from exposure and neglect. *Garrard*: Doing well. *Ballard*: Dogs and wolves detrimental. *Taylor*: Falling off in numbers; desire to invest in better breeds; have heard of very few being killed by dogs. *Henderson*: More interest is now being manifested.

OHIO.—*Adams*: Considered better property than formerly, and are now receiving more attention. *Allen*: "The wool boom has made them in demand; Spanish Merinos, Southdowns, and Leicesters are being extensively produced." *Ashtabula*: Not so many killed by dogs as last year. *Meigs*: Large increase; those killed by dogs are paid for by the county. *Medina*: Numbers increased; prices higher; dogs are taxed. *Vinton*: The advance in wool has caused farmers to abandon hogs and take up sheep. *Warren*: Since passage of the dog-law, the number killed by worthless curs grows less. *Williams*: "Booming again." *Lucas*: Dogs are taxed to pay for sheep destroyed. *Portage*: It is death to a dog here that pays any attention to sheep. *Union*: Wintering well; interest growing. *Clark*: Dogs have not been so destructive as usual. *Henry*: Numbers increased. *Clermont*: Sheep that are killed by dogs are paid for by the county out of the dog-tax fund.

MICHIGAN.—*Clinton*: Low prices of wool for the past two years caused many farmers to dispose of their flocks. *Delta*: Few raised. *Ionia*: Sold off rather close.

INDIANA.—*Franklin*: Dogs make sheep husbandry an uncertain business. *Decatur*: Numbers decreased; prices improved; less destruction by dogs than last year. *Crawford*: The number killed by dogs this year has been very large; the dog-tax collected is not sufficient to reimburse the losses, even at one dollar and a half per head. *Warren*: The number of useless sheep-killing dogs is decreasing each year since the passage of the dog-tax law. *Starks*: County well adapted to sheep-husbandry, but prevented by wolves; the county pays a bounty of \$10 for every wolf-scalp produced. *Marion*: Good demand; many fine ones recently brought into the county. *Brown*: Scarce; quality and price better than formerly; very few killed by dogs. *Orange*: Some Cotswold.

ILLINOIS.—*White*: But few. *Jackson*: Limited number. *Kendall*: Mostly of improved breeds. *Pope*: A large number have been taken out of the county during the past three months. *Saint Clair*: Remarkable improvement in the breeds; about the same number from year to year. *Wabash*: Demand for mutton reduced the number. *Bond*: Some destruction by wolves and dogs. *Alexander*: Few raised. *Bureau*: Wolves and dogs make the business unprofitable.

WISCONSIN.—*Marquette*: Wolves and dogs make them unprofitable, as they have to be housed at night. *Dunn*: Wolves are on the increase and are doing much damage; breeders of sheep discouraged and disposed to sell their flocks. *Racine*: Dogs are very troublesome. *Pierce*: The destruction by wolves has been so great that many farmers have disposed of their flocks and gone into other business. "A well-enforced dog-

license law has driven poor men out of the dog business, so their children are now better fed and clothed." *Rock*: Interest increased since the advance in wool. *Ver-non*: Many killed by dogs. *Walworth*: Reduced in numbers by sales to Western and Southern States; prices advancing, and wool interest increasing. *Door*: Heard of no depredations by dogs. *Waukeshara*: Most of them killed by wolves; discouraging business. *Polk*: Mostly killed by wolves. *Monroe*: More destruction by wolves than dogs.

MINNESOTA.—*Coltonwood*: Very few kept. *Pope*: Have heard of none being killed by dogs. *Jackson*: A large number sold out of county, as they command good prices; business profitable. *Fillmore*: Some good flocks brought in during the year, still there is room for more. *Martin*: "Our people have adopted the shotgun and strychnine policy."

IOWA.—*Appanoose*: No increase for years; demand has improved in the last three months. *Calhoun*: Do well, but are very scarce. *Marion*: Slight increase; interest reviving. *Union*: Very few. *Lee*: Good stock is being introduced; business is remunerative, but as yet there are few in number. *Fremont*: Wolves and dogs are the great drawback. *Howard*: Many farmers are going out of the business; dogs, and expense of fencing. *Ringgold*: Numbers decreasing; wolves and dogs.

MISSOURI.—*Gasconade*: Protected by a tax on dogs. *Jefferson*: Wolves destroy a great many. *Johnson*: A number of farmers have discontinued raising them, as the dogs take all the profits. *Platte*: Industry increasing; better breeds are being introduced. *Wright*: Many killed by dogs. *Carroll*: "Our law taxing dogs has diminished the number of worthless pests." *Saint Genevieve*: Dogs make sheep-husbandry a poor business; some years we lose 25 per cent. *Stone*: But few killed by dogs. *Dade*: Heard of none being killed by dogs.

KANSAS.—*Dickinson*: Industry growing; breeds are being improved. *Doniphan*: None to speak of. *Wallace*: But one flock in the county. *Jackson*: Heavy increase, principally by importation from the East. *Lincoln*: Have heard of none being killed by dogs. *Ottawa*: No losses by dogs; some lambs taken by wildents and cayotes. *Rush*: But few. *Washington*: Better demand than usual. *Reno*: Every one that is able is engaged in the business. *Chase*: But few flocks in the county.

NEBRASKA.—*Dawson*: Large number destroyed by wolves. *Hamilton*: Numbers increased about 50 per cent. *Nemaha*: None killed by dogs.

COLORADO.—*Pueblo*: None lost by dogs, as the shepherds go with the flocks by day and sleep with them at night.

CALIFORNIA.—*Calaveras*: About 1,000 killed by bears. *Contra Costa*: Doubled in price during the past three months, owing to advance in wool; dogs do little damage, as strychnine is freely used, but cayotes take a share of the lambs. *Humboldt*: Large increase; we are now having a severe snow-storm, and it is feared that hundreds will perish on the hills. *Napa*: Good breeds, and extensively raised in the hill and mountain districts. *San Luis Obispo*: Doubled in value during the past sixty days; large flocks purchased for Colorado and points east of the Rocky Mountains. *Fresno*: Sheep and cattle are our principal industries. *San Bernardino*: Removed, owing to scarcity of food. *Ventura*: Large numbers raised. *Stanislaus*: But few killed by dogs; many are lost in the mountains. *Solano*: No loss by dogs.

UTAH.—*Rich*: None killed by dogs, but the bears and wolves take a portion.

NEW MEXICO.—*Colfax*: Slow sale. *San Miguel*: Very few killed by dogs.

DAKOTA.—*Turner*: "Sheep husbandry is on the boom."

INDIAN TERRITORY.—None worth mentioning.

MONTANA.—*Deer Lodge*: Dogs have not yet learned to kill sheep.

HOGS.

Our returns indicate a reduction of 4 per cent. in the number of hogs as compared with last year, which implies a loss of nearly a million and

a quarter. The only sections showing increase are the Gulf States and the Pacific States. The former report an increase of 6 per cent. and the latter of 12 per cent.; but as these two sections represent only about one-sixth of the swine production in this country, their high per cents do not imply any great actual increase in the numbers. The different sections of the Atlantic slope average about 3 per cent. reduction. There are complaints in different parts of this region that economic conditions are changing, and that the cost of production leaves little or no margin of profit. Our correspondent in Montgomery, Md., says that hogs cannot be raised as profitably as in former days, when vast forests covered the county. Some cases of swine-plague are noted in Virginia, North Carolina, and Georgia, but the general condition of hogs on the Atlantic slope is good.

All the Gulf States except Texas report an increased number of hogs. The Southern Inland States fell off 4 per cent. In the States north of the Ohio River the numbers have fallen off 7 per cent., and the States west of the Mississippi 8 per cent. Very little disease is reported in these four sections, except in a few counties west of the Mississippi. In some cases in the Northwest farmers have exchanged hog production for sheep-raising, on account of improved prices of both sheep and wool. The reduction of stocks is largely due to selling off not only surplus but stock hogs. In the mining regions of the West it is stated that pork can be purchased cheaper than it can be produced in the neighborhood.

On the Pacific coast, California reports an increase of 17 per cent. and Oregon of 3 per cent. Subsistence was cheap, especially in the timbered counties, where a heavy crop of mast was realized.

Prices of pigs and shoats increased 11 per cent. in the whole country, all sections reporting an advance except the Pacific States. Hogs over a year old advanced 22 per cent., all sections of the country showing an appreciation of values. The greatest increase is in the sections of the Mississippi Valley.

NEW YORK.—*Genesee*: Numbers decreased; low prices of last year.

NEW JERSEY.—*Morris*: More attention bestowed on raising them. *Hunterdon*: Advanced in price.

PENNSYLVANIA.—*Armstrong*: In demand. *Bucks*: Scarcer than for the past three years.

MARYLAND.—*Montgomery*: Cannot be raised as profitably as formerly when large forests covered the county. *Cecil*: Better prices than last year.

VIRGINIA.—*Amherst*: Cholera fatal in a portion of county. *Charles City*: Some herds depleted by cholera. *Halifax*: Freer from disease than usual. *Chesterfield*: Numbers increasing and quality improving; Berkshire predominating.

NORTH CAROLINA.—*Bertie*: Those running at large are thriving poorly, owing to the dry weather of past four months. *Darrie*: Some cholera prevailing. *Gates*: About the usual number, but the pounds of pork not more than one-half; short corn crop prevented fattening.

GEORGIA.—*Cobb*: Numbers increased 10 per cent. *Dooley*: Considerable loss by cholera. *Putnam*: More attention given to improving the breeds. *Jefferson*: Lost 10 per cent. by cholera. *Taliaferro*: The number of stock hogs is larger and they are better cared for than formerly.

MISSISSIPPI.—*Leake*: Immunity from disease accounts for the increase in numbers. *Panola*: A large number and looking well. *Yazoo*: No increase, but quality improved. *Jefferson*: Raised for home consumption only. *Winston*: No disease. *Simpson*: More plenty than last year; better care given them.

TEXAS.—*Bastrop*: Cholera took a large number. *Ellis*: Exclusively improved breeds; no scrubs. *Grayson*: Cholera took one-fifth of stock. *Raines*: Fat; good mast. *Victoria*: Raised for home use only. *Burnet*: No sale. *Nacogdoches*: Some thumps. *Bezar*: Owing to failure of the corn crop, and not being allowed to run at large, they have almost disappeared from the county.

TENNESSEE.—*Anderson*: New and improved breeds are being introduced. *McNairy*: Falling off in numbers; low prices of the past few years. *Smith*: Scarcer than for many years. *Robertson*: Good demand. *Bradley*: Numbers are small, but quality is good. *Henderson*: Generally healthy and better cared for. *Lawrence*: Slight decrease. *McMinn*: Prices advanced. *Blount*: Looking up. *Decatur*: A less number than usual.

WEST VIRGINIA.—*Nicholas*: Some cholera.

KENTUCKY.—*Bracken*: Decreased; short corn crop. *Crittenden*: Even pigs are in good demand. *Logan*: No disease, and prices good. *Garrard*: Remarkably healthy. *Marshall*: Neglected; short corn crop and blighted mast. *Wayne*: Great falling off in numbers; cholera. *Allen*: Small crop. *Jefferson*: All over one year old have been either killed or sold.

OHIO.—*Meigs*: Decreased one-third. *Monroe*: Usual number marketed, but not so many held over. *Preble*: Decreased. *Warren*: Cholera took many stock hogs. *Williams*: Number decreased; farmers find sheep more profitable. *Allen*: Decreased; low prices of last year. *Geauga*: But few left that are over a year old. *Henry*: Increased; but little disease. *Adams*: Number diminished.

MICHIGAN.—*Allegan*: Short crop; low prices of past two years. *Cass*: Some cholera. *Delta*: Few raised. *Muskegon*: Decreased in number; short corn crop.

INDIANA.—*Brown*: Not so many as last year. *Carroll*: Decreased; disease, and low prices of last year. *Decatur*: Greatly decreased; considerable loss by disease; prices double those of last year. *Franklin*: Have not been profitable for several years until now. *Green*: Marketed earlier than last year, owing to the short corn crop. *Hamilton*: Better prices than last year. *Huntington*: Considerable cholera. *Kosciusko*: Cholera has not been so fatal. *Marion*: Better prices than we expected. *Steuben*: About 4,000 less than last year; but the increase in weight will balance the loss in numbers.

ILLINOIS.—*Bureau*: In some sections the cholera is making sad havoc. *Peoria*: Falling off; no cholera. *White*: Product decreased; low prices of past two years, and increased acreage of wheat. *Whitesides*: Numbers diminished by disease. *Lee*: Fell off 30 per cent. *Pope*: A large number taken out of the county during the past three months. *Putnam*: Numbers decreased by disease. *Wabash*: Number reduced; disease, and low prices of past two years. *Hancock*: Diseases nearly abated. *La Salle*: Generally healthy, but a few losses by cholera.

WISCONSIN.—*Dane*: Low prices of past two years accounts for the decrease in numbers. *Grant*: 30 per cent. of the shoats were lost by disease. *Juneau*: Not so many as last year; considerable cholera. *Dunn*: Falling off; low prices of the last two years. *Racine*: Numbers decreased 20 per cent. *Calumet*: Low prices of the past two years caused a decrease. *Walworth*: Numbers reduced, and less interest taken in this industry. *Rock*: Good demand, and remunerative prices.

MINNESOTA.—*Fillmore*: Increased in number, and better quality than formerly.

IOWA.—*Muscatine*: Decreased; high price of corn, and demand for pork. *Appanoose*: Healthy; almost 100 per cent. advance in price since January, 1879. *Hardin*: Cholera is alarmingly on the increase. *Marion*: Plague and good prices of cereals have shortened the crop. *Monroe*: Prices advanced 25 per cent. in the past six months. *Polk*: Crop will be heavier than usual. *Sioux*: Increased attention given to this industry. *Union*: Decreased. *Washington*: More lost by disease than in any

previous year; artichokes appear to keep them healthy. *Guthrie*: Less loss by disease. *Henry*: Cholera decreased the crop. *Linn*: But little cholera. *Plymouth*: Numbers reduced. *Ringgold*: Scarce; disease and heavy shipments. *Madison*: In south half of county 50 per cent. have died with cholera. *Monona*: Cholera has prevented any increase.

MISSOURI.—*Audrain*: Generally marketed between twelve and eighteen months old. *Caldwell*: Some cholera. *Howard*: Those over one year old are marketed. *Monteau*: Better prices than last year. *Platte*: Very scarce. *Carroll*: Hurried off to market to escape cholera; none remain that are over a year old. *Mercer*: Many are dying with cholera. *Pettis*: Doing well; but little disease; command good prices. *Saint Clair*: We have many of pure breeds that command high prices. *Cass*: About 20,000 are being fed for spring market.

KANSAS.—*Cherokee*: Healthy. *Dickinson*: Decided improvement in the breeds; many Poland China, and Berkshire. *Doniphan*: More shoats but fewer fat hogs than last year; some cholera. *Harvey*: Climate well adapted to raising hogs; have not heard of a case of hog cholera in seven years. *Jackson*: Bulk of crop sold under one year old. *Ottawa*: But few over one year old left.

NEBRASKA.—*Otoe*: Farmers are much encouraged; cholera decreasing and prices advancing—the results of better care and better knowledge of methods of prevention and cure. *Sarpy*: High prices caused them to be sold close. *Seward*: Great scarcity. *Webster*: We are losing large numbers by (supposed) cholera; on being cut open, holes are found in the flesh, as if eaten by worms; farmers changing from hogs to cattle and sheep. *Nemaha*: More than doubled. *Lancaster*: Looking well.

COLORADO.—*Fremont*: We can buy our pork cheaper than we can raise it; silver mining overrules everything else.

CALIFORNIA.—*Napa*: Low in price, and likely to be neglected. *Solano*: Numbers decreased, owing to low prices of last year. *San Luis Obispo*: Exceedingly abundant, and no market; large crop of acorns, and hogs in excellent condition. *Yuba*: Low prices of last year caused a less number to be bred. *Stanislaus*: Increasing. *Ventura*: Numbers decreasing, as prices do not justify raising them.

INDIAN TERRITORY.—We have a much better class of half-breed hogs than we had a few years ago.

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Table showing the estimated numbers of farm stock, expressed as a percentage of the numbers of the previous year, and also an average of actual prices in January, 1880.

States.	Total number of horses compared with that of January, 1878.	HORSES.			MULES.			
		Average price per head under one year old.	Average price per head between one and two years old.	Average price per head between two and three years old.	Average price per head under one year old.	Average price per head between one and two years old.	Average price per head between two and three years old.	Average price per head over three years old.
Maine	Percentage.							
New Hampshire	100	\$25.55	\$33.33	\$78.17				
Vermont	100	39.50	62.60	77.40				
Massachusetts	100	35.10	53.30	84.80				
Rhode Island	104	28.50	48.00	115.00				
Connecticut	101	26.66						
New York	100	27.50	65.00	70.00				
New Jersey	100	52.00	68.95	96.80				
Pennsylvania	98	29.82	65.63	85.64				
Delaware	102	27.50	72.50	85.00				
Maryland	100	25.00	59.15	82.30				
Virginia	102	22.96	50.74	70.63				
North Carolina	101	24.68	54.90	70.86				
South Carolina	104	29.00	68.50	89.36				
Georgia	100	24.08	59.35	81.75				
Florida	101	23.64	53.31	82.27				
Alabama	100	28.76	53.31	69.10				
Mississippi	102	18.98	43.52	68.94				
Louisiana	104	14.00	33.37	62.14				
Texas	105	9.87	19.78	29.35				
Arkansas	106	17.62	30.46	56.20				
Tennessee	101	23.41	49.43	66.49				
West Virginia	102	20.31	46.77	62.14				
Kentucky	104	21.66	43.30	58.46				
Ohio	105	25.92	45.09	75.12				
Michigan	105	26.80	68.09	92.00				
Indiana	100	24.78	52.07	70.22				
Illinois	98	25.26	57.01	64.10				
Wisconsin	102	22.84	58.49	80.81				
Minnesota	111	26.33	58.30	88.34				
Iowa	101	23.84	51.89	72.85				
Missouri	102	23.04	35.82	63.17				
Kansas	109	20.40	37.46	53.17				
Nebraska	112	22.45	45.76	64.36				
California	100	16.57	56.10	78.03				
Oregon	107	22.14	38.00	63.15				
Colorado, Nevada and Territories.	115	15.46	50.00	72.86				
			37.00	56.37				
					22.75	37.07	65.47	85.75

Table showing the estimated numbers and prices of farm-stock in January, 1890—Continued.

States.	MILCH COWS.			OXEN AND OTHER CATTLE.			SHEEP.			HOGS.		
	Total num- ber of milch cows com- pared with that of Jan- uary, 1879.	Average price per head at this time.	Total num- ber of oxen and other cattle com- pared with that of Jan- uary, 1879.	Average price per head, be- cause of years old.	Average price per head, be- cause of years old.	Average price per head, be- cause of years old.	Total num- ber of sheep compared with that of January, 1879.	Average price per head, be- cause of years old.	Average price per head, be- cause of years old.	Total num- ber of hogs compared with that of January, 1879.	Average price per head, be- cause of years old.	Average price per head, be- cause of years old.
	Percentage.		Percentage.				Percentage.			Percentage.		
Maine.....	45	\$24 10	101	\$7 60	\$14 30	\$21 77	107	\$2 67	\$3 41	99	\$6 53	\$15 75
New Hampshire.....	100	28 00	98	8 00	13 20	25 70	103	2 30	3 00	95	8 50	19 00
Vermont.....	95	25 05	99	7 02	12 90	20 90	107	2 82	3 72	98	6 17	14 04
Massachusetts.....	104	35 00	100	9 75	15 25	28 50	104	2 82	3 75	100	9 00	17 60
Rhode Island.....	100	30 00	110	8 00	13 00	25 00	115	2 75	3 75	90	6 00	15 00
Connecticut.....	102	29 37	104	11 33	16 33	32 33	101	2 75	3 56	99	6 87	17 50
New York.....	99	29 06	104	8 37	16 33	26 86	104	2 84	3 83	96	5 40	11 07
New Jersey.....	101	35 10	100	10 16	14 45	28 60	98	3 07	4 10	100	5 48	12 11
Pennsylvania.....	101	20 66	96	8 62	14 63	23 69	99	2 35	3 30	98	5 03	10 32
Delaware.....	107	32 50	100	10 00	20 00	30 00	105	3 50	3 87	100	5 00	6 75
Maryland.....	99	27 20	101	8 35	13 82	21 07	105	2 68	3 31	101	3 57	7 52
Virginia.....	101	18 86	100	6 00	10 30	15 97	102	1 87	2 37	101	2 70	5 28
North Carolina.....	99	12 60	100	3 31	5 69	8 44	100	1 08	1 63	100	2 09	4 74
South Carolina.....	101	15 25	98	4 80	7 08	10 00	97	1 25	1 94	107	2 17	4 96
Georgia.....	100	13 26	99	3 52	5 51	8 21	100	1 08	1 59	104	2 06	4 42
Florida.....	104	9 27	100	3 15	4 30	6 40	100	1 06	1 92	110	1 57	3 57
Alabama.....	101	13 50	104	3 34	5 43	7 66	105	1 06	1 73	102	1 85	4 22
Mississippi.....	101	13 06	100	2 92	4 60	7 16	104	1 11	1 71	118	1 74	4 21
Louisiana.....	103	18 00	101	3 75	5 00	8 75	106	1 12	1 64	105	2 64	4 61
Texas.....	104	13 85	93	4 13	6 22	9 68	114	1 33	2 13	98	1 53	3 38
Arkansas.....	106	13 66	104	4 06	7 23	10 71	100	1 03	1 77	102	1 90	4 51
Tennessee.....	101	17 09	96	4 07	7 81	10 71	100	1 29	2 17	90	2 39	5 01
West Virginia.....	101	20 97	96	7 82	14 14	21 67	105	1 66	2 40	101	2 49	5 85
Kentucky.....	105	22 62	95	8 04	14 03	21 73	90	2 03	2 76	92	2 46	5 53
Ohio.....	98	26 44	99	9 43	15 81	25 53	101	2 13	3 16	90	3 46	8 45
Michigan.....	100	26 68	104	6 92	13 56	22 74	102	1 72	2 87	95	3 62	8 09
Indiana.....	99	25 09	97	7 87	14 13	22 11	98	1 85	2 51	94	3 41	7 57
Illinois.....	99	26 63	101	7 25	14 86	23 38	102	1 84	2 83	96	4 02	8 46
Wisconsin.....	96	21 70	98	6 30	11 22	17 87	101	1 80	2 63	90	3 85	8 81
Minnesota.....	109	20 16	102	6 04	11 03	15 60	102	1 47	2 36	90	3 83	8 52
Iowa.....	107	24 20	101	7 23	11 48	22 73	102	1 40	2 84	94	3 08	8 74
Missouri.....	102	19 21	101	6 36	10 20	22 65	102	1 72	2 48	93	2 41	5 63
Kansas.....	100	23 68	112	8 35	14 20	22 45	119	1 70	2 95	111	2 70	8 34
Nebraska.....	112	28 00	116	8 24	15 21	24 00	120	1 80	2 95	115	2 84	7 91
California.....	103	28 65	99	7 42	12 71	19 11	111	1 18	1 80	117	2 81	5 70
Oregon.....	108	17 71	107	4 00	7 86	12 07	109	1 11	1 64	103	1 71	3 70
Colorado, Nevada, and Territories.....	111	20 96	108	4 76	10 88	11 98	117	1 35	2 18	108	3 80	9 70

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